

# Hood River Subbasin Summary

*(including Oregon tributaries between  
Bonneville Dam and the Hood River)*

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# Hood River Subbasin Summary

## Introduction

The 482-square mile Hood River Subbasin (Figure 1) is located in north central Oregon within Hood River County. For the purposes of this summary, the subbasin is divided into two watershed areas: (1) the Hood River and its tributaries; and (2) the Oregon Columbia Gorge Tributaries between Bonneville Dam and the Hood River. The Hood River Subbasin is bounded on the north by the Columbia River, on the west by the Cascade Mountains crest, and on the east by Surveyors Ridge and the Wasco County line. The White River drainage forms the south boundary. The major stream is the Hood River, which drains 339 square miles and flows northeasterly into the Columbia River 22 miles upstream of the Bonneville Dam. Herman and Eagle creeks are the largest of the Columbia tributaries between Hood River and the Bonneville Dam. The subbasin contains the cities of Cascade Locks and Hood River.

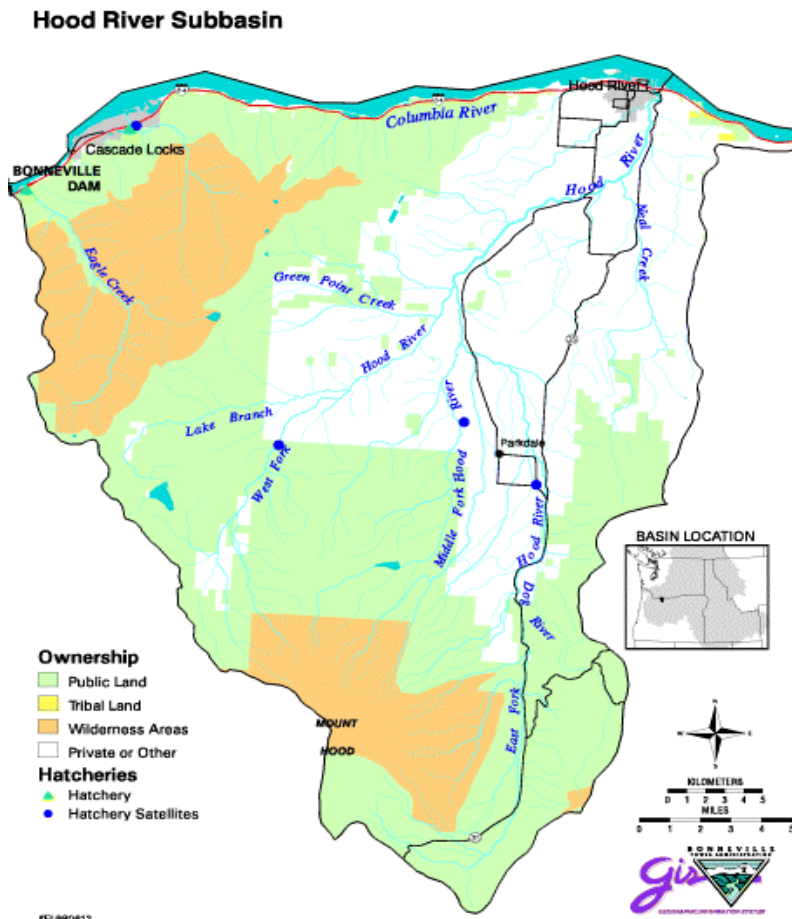


Figure 1. Map showing location of Hood River Subbasin including the Oregon Columbia Gorge Tributaries upstream of the Bonneville Dam

## AREA 1: HOOD RIVER WATERSHED

### Fish and Wildlife Resources

#### Subbasin Description

##### General Location

The Hood River watershed is in north central Oregon in Hood River County and covers 339 square miles (Figure 2). The Hood River flows north from Mt. Hood into the Columbia River 22 miles upstream of the Bonneville Dam.

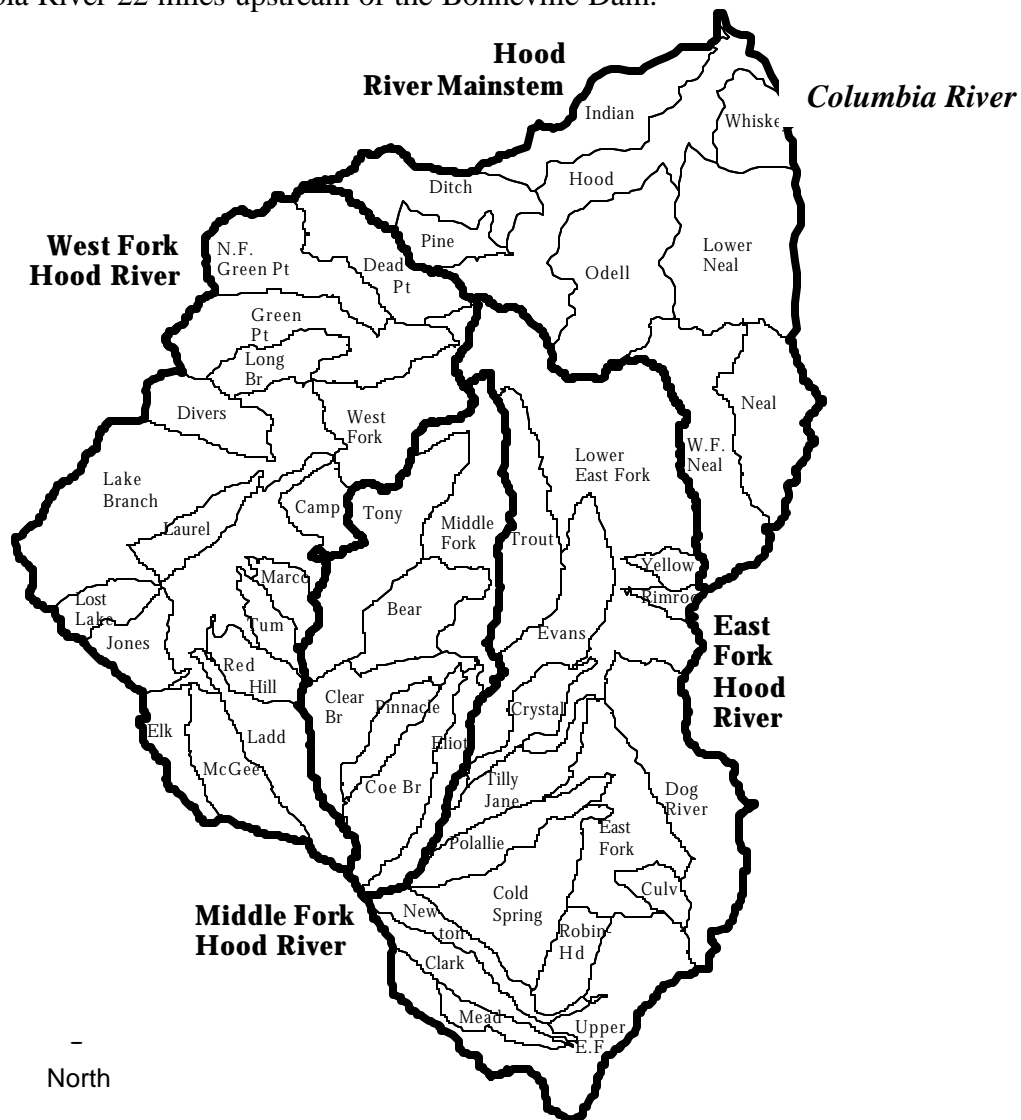


Figure 22. Watershed boundaries for 4 fifth-field U.S.G.S. Hydrologic Unit Code watersheds and 50 sixth-field subwatersheds delineated for the Hood River (HRWG 1999)

### Drainage Area

The Hood River has three major forks - the West Fork Hood River enters the mainstem 12 miles from the Columbia, while the Middle and East Fork Hood River converge near River Mile 15. The watershed has an estimated 695 stream miles with 108 miles accessible to anadromous fish. Watershed boundaries are shown in Figure 2.

### Topography/geomorphology (geology/soil types)

Glaciation and flooding has shaped the Hood River area landscape which is characterized by steep, narrow valleys and terraces of clay, silt, sand, gravel and boulders. Rock formations are primarily volcanic Columbia River basalt. The Lower Hood River Valley is a broad, north-sloping bench. The Hood River and many of its tributaries cut deeply into this bench forming steep canyons. The Upper Valley lies between the northeast shoulder of 11,240-foot Mt. Hood and the 2,642-foot Middle Mountain. Streams here are not as deeply incised and have a greater tendency for channel meander (Wells 1999). Most channels are moderate to high gradient, but the Hood River and its East and West forks all contain gentle reaches under 2.5 percent gradient in relatively broad valleys.

Five upper tributaries are fed by glacial sources and transport large amounts of bedload and sediment into the Middle Fork, East Fork, and mainstem of the Hood River, and to a lesser extent into the West Fork. Glacial melt occurs sporadically between July and October increasing water turbidity. Catastrophic landslides and dam-break floods originating on the moraines and steep slopes of Mt. Hood are periodically triggered by heavy rainfall. Coarse boulder-rubble dominate stream substrates.

### Climate

The watershed lies in the transition zone between the marine climate to the west and the drier continental climate to the east. Annual precipitation varies from west to east, and with elevation, ranging from 140 inches to less than 30 inches. Watershed hydrology is characterized by highly variable streamflows and rapid storm runoff. Snowmelt often begins in April. Approximately 80 percent of streams have perennial flow. The average annual Hood River flow is 1,079 c.f.s. (U.S.G.S. Gage No. 1412000), while the average monthly low flow is approximately 400 c.f.s. and normally occurs in September. Rain-on-snow floods are common. The record flood of 33,200 c.f.s. occurred December 1964.

### Major Land Uses

Over half of the watershed is managed by the U.S. Forest Service (USFS). Major land uses on non-federal land are agriculture and timber production (Figure 3). Approximately 15,000 acres are irrigated for fruit orchards and 2,000 for pasture. Hood River County owns 30,000 acres dedicated as industrial forest, and Longview Fibre Company owns 22,000 acres of timber land. Outdoor recreation and tourism is rising with population growth in Portland and the Columbia River Gorge. Conversion of forest and pasture to residential uses is increasing. The Hood River County population is currently around 19,000 and is projected to increase by 3,000 to 4,000 people every five years, reaching 36,483 by the year 2040 (USFS 1996a).

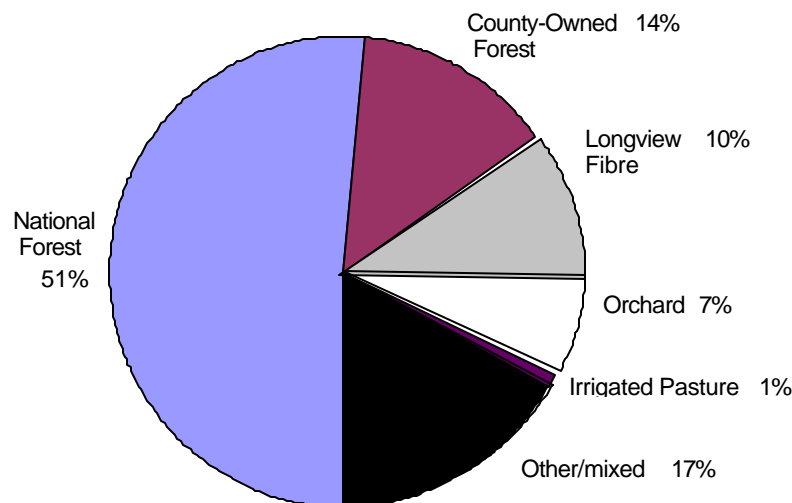


Figure 3. General land use in the Hood River watershed by proportion (HRWG 1999)

## Fish and Wildlife Status

### Fish

Anadromous salmonids present in the Hood River watershed include spring and fall chinook (*Oncorhynchus tshawytscha*) and coho salmon (*O. kisutch*), sea run cutthroat trout (*O. clarki*) and summer and winter steelhead trout (*O. mykiss iridius*). Pacific lamprey (*Lamptera tridentata*) are present in the lower Hood River. Available records and anecdotal accounts indicate that anadromous fish populations are less diverse and severely depressed compared to historic levels. Hood River native coho, spring chinook and fall chinook stocks are extinct and steelhead are currently listed as Threatened under the Endangered Species Act (ESA). Little is known about sea run cutthroat trout except that recent adult returns have numbered from zero to five individuals annually. Table 1 summarizes current management goals for subbasin anadromous fish populations. The status, distribution and management of each species are discussed below in greater detail.

Table 1. Management goals for anadromous fish in the Hood River Subbasin (M. Jennings, CTWSRO, pers. comm)

Stock	Genetic History And Management Intent	Spawning Escapement Goal	Hatchery Take Goal	Harvest Goal	Escape- ment goal @ Mouth
Spring Chinook	Native stock extinct. Supplement natural production with Deschutes stock using hatchery and natural returns to Powerdale Dam.	400	200220	1100	1700
Fall Chinook	Maintain wild stock. Evaluate potential for supplementation.	250	0	50	None established

Stock	Genetic History And Management Intent	Spawning Escapement Goal	Hatchery Take Goal	Harvest Goal	Escape- ment goal @ Mouth
Summer Steelhead	Manage for wild and hatchery using Hood River broodstock	2400	200160	54005440	8000
Winter Steelhead	Manage for wild and hatchery using Hood River broodstock	2400	20090	24002510	5000
Coho	Maintain population	50	0	10	None established
Lamprey	Maintain population -management under discussion. Inventory status & distribution.	None established	-	-	-

#### Spring Chinook

The Hood River native spring chinook population became extinct in the late 1960s. The Deschutes stock is being used to reestablish a self-sustaining Hood River spring chinook population. The first releases of Deschutes stock into the Hood River occurred in 1993. Currently, the naturally spawning population remains under 100 returning adults. Initial collection of broodstock from the Hood River was made in 1997. Spring chinook spawn primarily in the West Fork Hood River and in Lake Branch Creek, but may spawn in other areas including the mainstem Hood River. A 1997 spawning survey estimated 48 spring chinook redds in the West Fork drainage with the highest concentrations in Lower Lake Branch, in the West Fork below Punchbowl Falls and between Ladd, Elk and McGee creeks (CTWSRO 1998). See Figure 4.

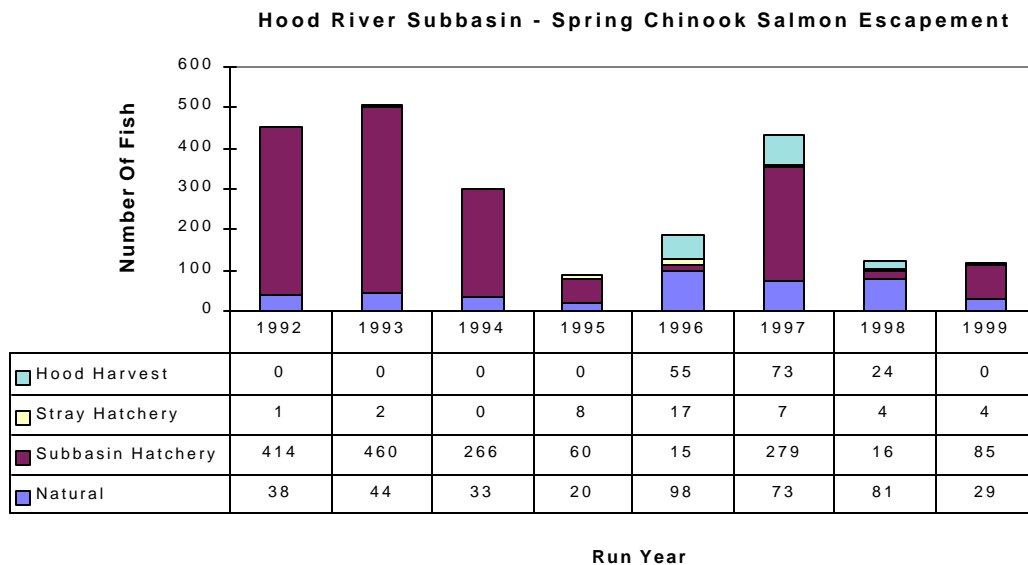


Figure 4. Recent spring chinook returns to the Powerdale Fish Trap (RM 4.5).

Note: scale-verification data expected to modify these numbers slightly

#### Fall Chinook

Most fall chinook spawning occurs downstream of Powerdale Dam. Since 1991, the average escapement of fall chinook jacks and adults to Powerdale Dam has been 20 fish.



Up to 25 percent of the fall chinook escapement to Powerdale Dam is made up of hatchery strays. No releases of hatchery fall chinook are made.

#### Summer Steelhead

Steelhead are currently listed as Threatened under the ESA. Summer steelhead primarily spawn in the West Fork drainage and are currently at very low numbers. Naturally spawning summer steelhead are thought to be predominately native stock origin (O'Toole and ODFW 1991). Escapement of summer steelhead to Powerdale Dam in 1998 included 172 wild and 1041 Skamania stock hatchery origin adults. See Figure 5.

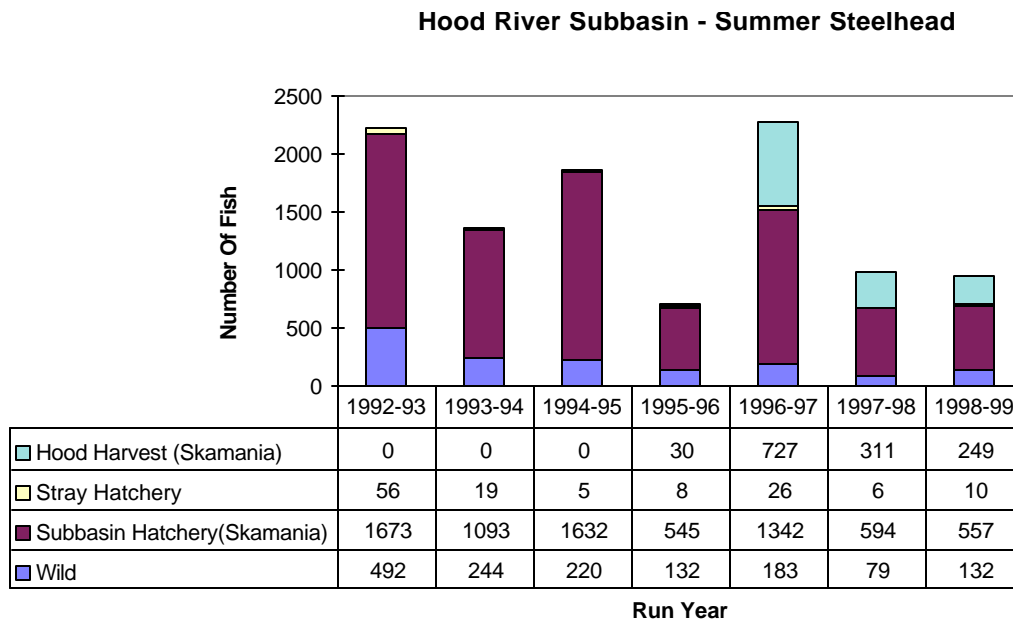


Figure 5. Recent summer steelhead returns to the Powerdale Fish Trap (RM 4.5). Note: scale-verification data expected to modify these numbers slightly

#### Winter Steelhead

Steelhead are currently listed as Threatened under the ESA. Winter steelhead primarily spawn in the East Fork Hood River although some production occurs in the Middle Fork and mainstem Hood River and in Neal Creek. Historically, steelhead were found in the East Fork upstream to Cold Spring Creek and in Clear Branch above Pinnacle Creek in the Middle Fork (USFS 1996b). Escapement of winter steelhead over Powerdale Dam averaged 692 from 1993 to 1998 including 367 wild and 274 hatchery origin adults. Release of non-native, hatchery origin winter steelhead was eliminated in 1992 when a Hood River broodstock program was initiated. See Figure 6.

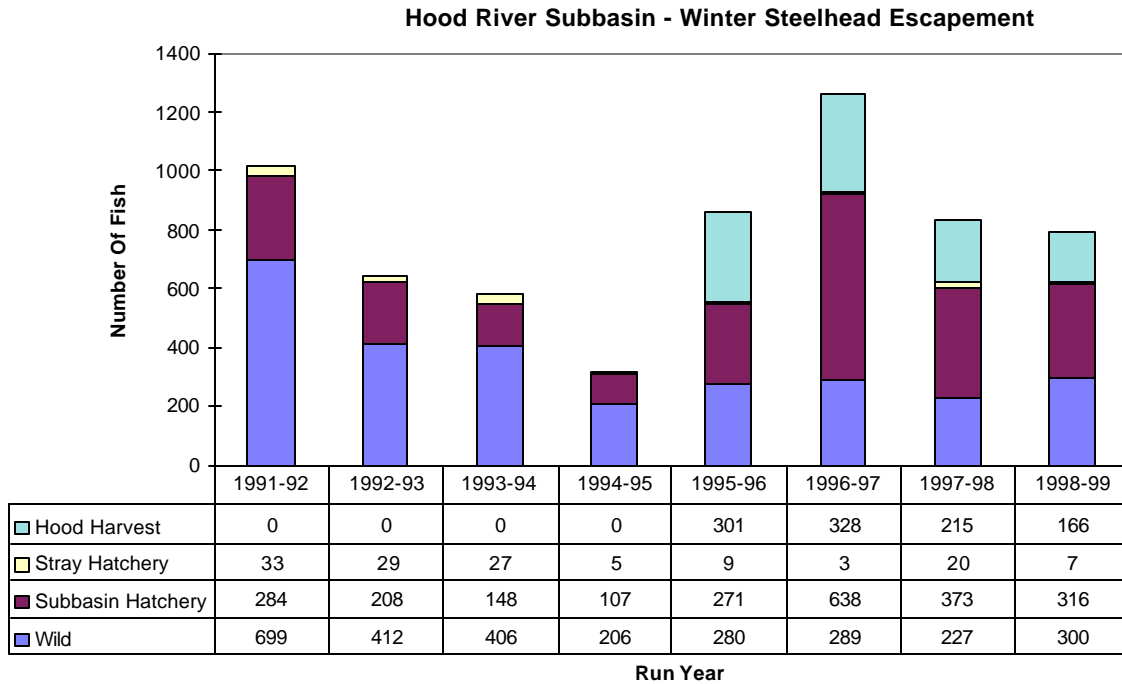


Figure 6. Recent winter steelhead returns to the Powerdale Fish Trap (RM 4.5). Note: scale-verification data expected to modify these numbers slightly

#### **Coho**

Coho spawn in the Hood River mainstem above and below Powerdale Dam, in the mouth of Whiskey Creek, in Neal Creek, the East Fork Hood River and its tributaries and the Middle Fork Hood River. Coho spawning distribution was likely more extensive historically than it is today. In the mid-1960s, coho spawned in Clear Branch in the area now inundated Laurance Lake reservoir (USFS 1996b). Escapement of coho to Powerdale Dam has averaged 54 individuals for the last five years. These are primarily of stray hatchery origin with the naturally produced population averaging 20 percent of the total escapement.

#### **Sea-run Cutthroat**

Coastal cutthroat trout are native to the watershed and are most numerous as resident fish in the upper tributaries of the East Fork. Sea-run cutthroat are listed as a sensitive species by the Oregon Department of Fish and Wildlife (ODFW) and may be severely depressed in the Hood River. In 1992, five adult sea run cutthroat trout passed Powerdale Dam and three were counted by ODFW in 1997, otherwise recent returns have been zero. In 1995 and 1996, only 16 and 24 downstream migrant cutthroat were captured in the migrant traps. The present or historic spawning distribution of sea-run cutthroat trout is unknown. An anecdotal account by a local resident suggests that a large run of sea run cutthroat trout formerly used a lower Neal Creek tributary. Juvenile plants from various hatchery stocks were made in the watershed between 1973 and 1988 (Bonneville Power Administration, BPA 1996).

### **Pacific Lamprey**

In 1963 the Oregon State Game Commission noted that lamprey were found “throughout the basin” (1963 OSGC). Their numbers appear to have dropped dramatically compared to historic population levels. Lamprey are thought to be extirpated from the West Fork watershed (USFS 1996a). Lamprey have been observed in recent years only in the lower river below the Powerdale Dam.

Resident salmonids in the Hood River watershed include rainbow, bull, cutthroat, brown and brook trout, as well as mountain whitefish. Pure strains of rainbow and cutthroat trout are present as well as rainbow-cutthroat hybrids. Rainbow trout are dominant in west tributaries while cutthroat dominate streams in the mid-to-east tributaries such as Bear, Tilly Jane and Robinhood creeks. An isolated cutthroat population was recently found by the Forest Service upstream of a falls on Clear Branch above Laurance Lake. Table 2 shows the general distribution of resident fish in the watershed.

Table 2. Distribution of native resident fish in the Hood River watershed

<b>Species</b>	<b>Spawning/adult Holding areas</b>	<b>Rearing areas or juveniles present</b>
Bull trout	Middle Fork Mainstem Clear Branch Coe Branch and tributaries Pinnacle and Compass Creek	Middle Fork Mainstem Clear Branch Coe Branch and tributaries Pinnacle and Compass Creek
Rainbow trout	Entire subbasin	Entire subbasin
Cutthroat trout	Entire subbasin	Entire subbasin
Mountain whitefish	Mainstem Hood River	East , West & Middle Forks Hood River
Bridgelipped sucker	Below Powerdale Dam	Below Powerdale Dam
Sculpin	Entire subbasin	Entire subbasin
Longnose dace	Unknown	Unknown

A small population of interior redband rainbow trout exists in North Fork Green Point Creek (Greg and Allendorf 1995). The redband is listed by ODFW and U.S. Forest Service as a sensitive species and is currently under an ESA status review throughout its range. Brook trout and brown trout are not native to the watershed but have been stocked in high lakes. In some areas they have distributed into downstream tributaries and apparently are reproducing. The stocking of brown trout has been discontinued.

### **Bull Trout**

Bull trout are currently listed as a Threatened Species under ESA. Hood River bull trout are genetically distinct from other bull trout in Oregon (Spruell and Allendorf 1997). The population, including juveniles, is believed to number less than 300 and is classified “*at high risk of extinction*” by ODFW (Buchanan et al. 1997). Bull trout are primarily found in headwater streams of the Middle Fork in the Mt. Hood National Forest. The largest proportions are found in Laurance Lake and upper Clear Branch. Peak adult counts have ranged from 15 to 30 in upper Clear Branch during surveys conducted since 1991. Hood River bull trout exhibit three life history patterns. A fluvial population migrates between

small tributaries used for spawning and early rearing and the main forks, mainstem Hood River and the Columbia River used for late juvenile or adult rearing. An adfluvial population spawns and rears in small streams and uses Laurance Lake for late or adult rearing. Resident bull trout generally remain in their natal stream (Buchanan et al. 1997). The number of adults entering the Powerdale Fish trap annually from 1991 to 1999 ranged from 2 to 28 fish.

#### **Wildlife**

A variety of wildlife including large and small mammals, waterfowl, passerines, raptors, reptiles and amphibians are associated with Hood River riverine, wetland and upland habitats. While population status varies by area and species, many wildlife species are listed as federal and/or state Threatened, Endangered, Sensitive or At-Risk. Species associated with mature forest and large home ranges such as northern goshawk, spotted owl, pileated woodpecker, wolverine, and pine martin have all been documented in recent years. In the East Fork Hood River drainage, 15 spotted owl activity centers were documented in 1993 with the highest spotted owl pair at 4600 feet elevation near Mt Meadows Ski Area. Harlequin duck are noted as abundant in the Hood River relative to other watersheds in the Mt. Hood National Forest (USFS 1996a). Four spotted owl pairs resided in the Middle Fork Hood River watershed as of 1993, but more recent U.S. Forest Service surveys have not confirmed the continued presence of all four of these pairs. Peregrine falcon are known to use cliffs along the Columbia River for nesting habitat, and riverine and open orchard lands as foraging areas. Locally extirpated species include gray wolf, grizzly bear, condor and mountain goat. Big game, furbearers, upland birds, and waterfowl species are managed by federal and state wildlife managers. Deer and elk in Hood River County are managed for a winter population of 400 and 130, respectively. The watershed lies along a migratory waterfowl lane of the Pacific flyway.

#### **Habitat Areas and Quality**

##### **Fish**

ODFW stream surveys conducted between 1992 and 1994 indicate that pool habitat and gravel availability are low compared to ODFW Aquatic Inventory Project regional habitat quality benchmarks (Figure 7). Only eight of a total of 63 miles of anadromous stream length surveyed had a "desirable" amount of pool area and less than 25 miles had "desirable" pool frequency ratings. Gravel availability met or exceeded desirable levels in only 16 miles.

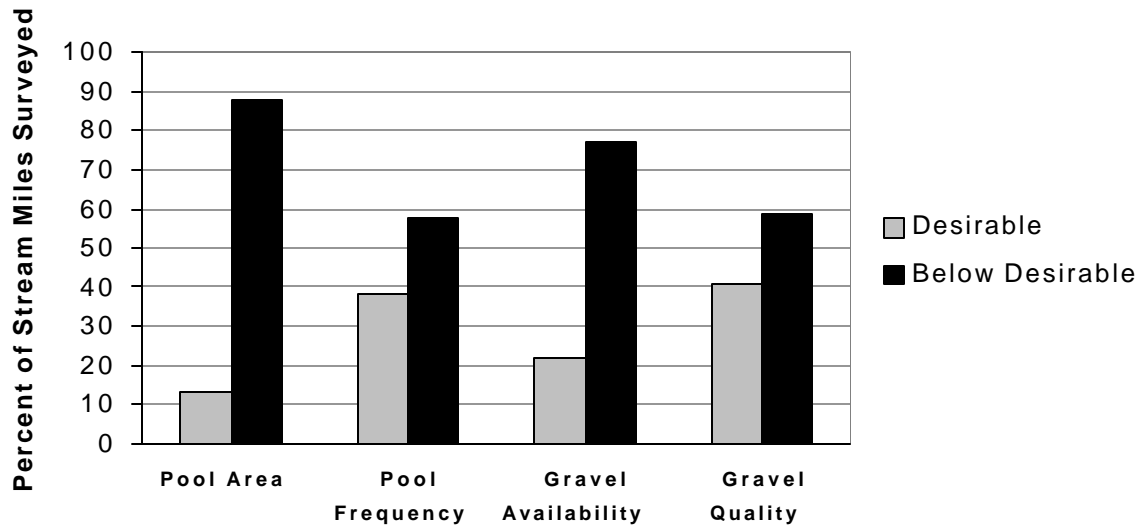


Figure 7. Habitat ratings for 63 miles of Hood River streams surveyed using ODFW Aquatic Inventory Project regional benchmark values. Surveys conducted from 1992 to 1994 (ODFW 1995)

Water quality in several stream segments is considered impaired by Oregon Department of Environmental Quality (DEQ). These segments are listed on the State 303-d list, primarily for temperature (Table 3).

Table 3. Water quality limited stream segments in the Hood River watershed per the Oregon Department of Environmental Quality 1998 final Clean Water Act 303(d) list

Stream Segment	Listed Parameters (season)	Criteria
Lake Branch – Rivermile 10 to Lost Lake	Temperature (summer)	Fish Rearing 64°F (17.8°C)
Clear Branch – Mouth to Laurance Lake	Temperature (summer)	Oregon Bull Trout 50°F (10°C)
Middle Fork Hood River – Mouth to Clear Branch	Temperature (summer)	Oregon Bull Trout 50°F (10°C)
Neal Creek – Mouth to East/West Fork confluence	Temperature (summer)	Fish Rearing 64°F (17.8°C)
Whiskey Creek – Mouth to Headwaters	Temperature (summer)	Fish Rearing 64°F (17.8°C)
Indian Creek – Mouth to Headwaters	Temperature (summer)	Fish Rearing 64°F (17.8°C)
Hood River – Powerdale Powerhouse to Diversion Dam	Temperature (summer) pH (summer)	Fish Rearing 64°F (17.8°C) pH range of 6.5-8.5

## Habitat Areas and Quality by Major Drainage Area

### West Fork Hood River

The major tributaries in the West Fork Hood River drainage are Lake Branch, Elk, McGee and Greenpoint Creek. The West Fork mainstem has an average gradient of 2.5 percent; Lake Branch has an average gradient of 4 percent, while Greenpoint Creek has gradients of 4 to 6 percent in the lower three miles. The amount of complex pool habitat and in-channel wood debris have been reduced by historic timber harvest, stream clearing and the use of splash dams (Figure 8). Some segments have cut down to bedrock and become disconnected from their floodplains. Rapids and scour pools are the most common

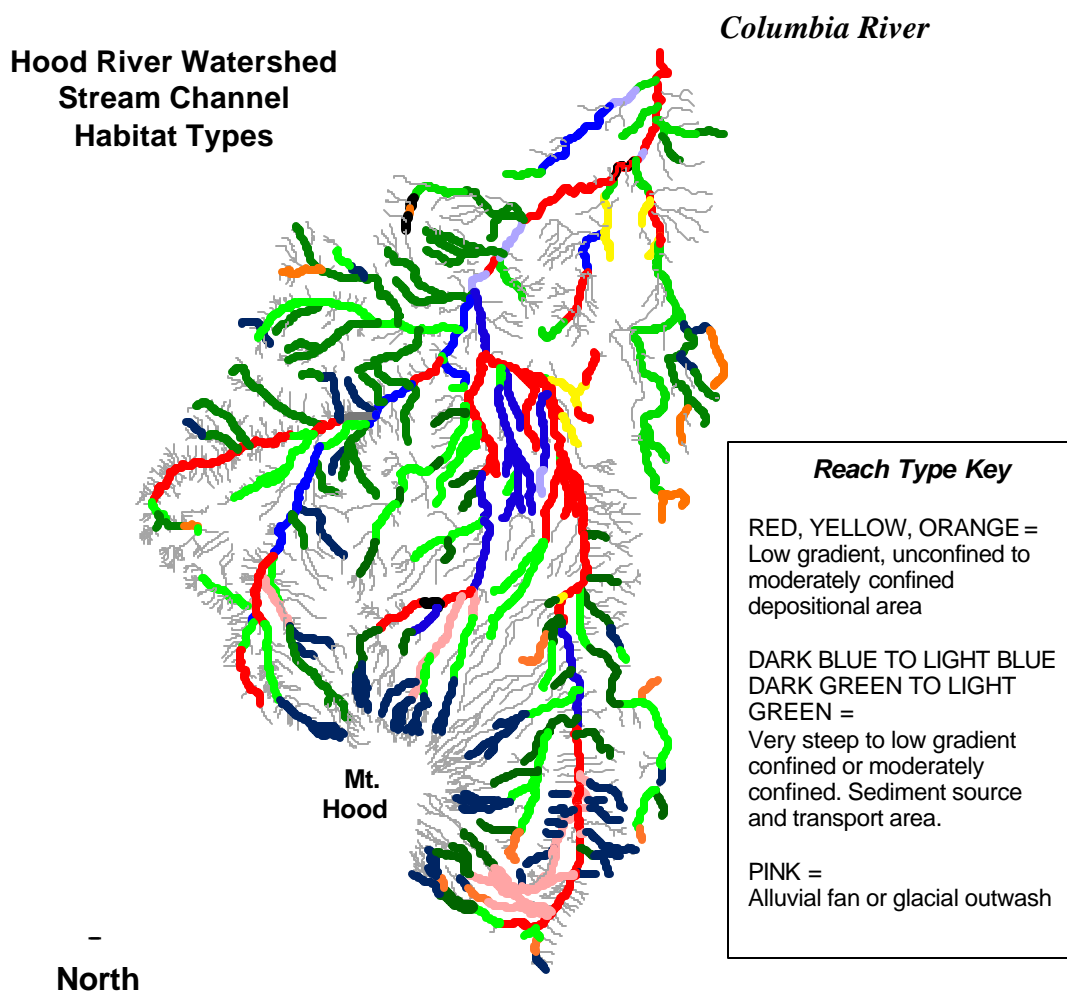


Figure 8. General channel habitat types for the Hood River watershed showing important depositional areas in red. Specific classifications using the Oregon stream classification system are given in the Hood River Watershed Assessment (HRWG 1999)

habitat types in the West Fork and Lake Branch, with rapids, scour pools and cascades in Greenpoint Creek. Overall, streambeds are dominated by boulders and cobble. In many

areas, spawning gravel is limited to stream margins where it is unavailable to fish spawning at low flows. However, parts of the West Fork Hood River and Lake Branch contain some of the highest quality steelhead and spring chinook spawning and rearing habitat in the Hood River subbasin at the present time. Several reaches of Lake Branch, the West Fork and Greenpoint Creek possess pool area meeting the ODFW Aquatic Inventory Project “desirable” benchmark, i.e., greater than 35 percent of reach length in pools. Most of Lake Branch ranked as “desirable” for pieces and volume of large woody debris in 1994 stream surveys. Riparian vegetation is mixed conifers and hardwoods. Irrigation and municipal diversions occur in Lake Branch, Greenpoint Creek, and the West Fork Hood River. State instream water rights are established in the West Fork Hood River but are not reliably met, and summer low flow restoration has been identified as needed in Greenpoint Creek. Average road density is moderate at 2.9 miles per square mile.

#### Middle Fork Hood River

Primary habitat areas in the Middle Fork drainage include the Middle Fork Hood River with a moderate average gradient (4 percent), Clear Branch with gradients averaging 2 to 4 percent, and Tony Creek higher average gradients. Coe and Elliot branch tributaries introduce large amounts of glacial sand and flow into the Middle Fork Hood River. Sand and boulders dominate the streambed in the mainstem Middle Fork, and spawning gravel availability does not meet desirable levels. In November 1999 a natural landslide deposited a huge amount of coarse sediment in the mouth of Elliot Branch and has eliminated surface flow for several hundred yards. Clear Branch Dam at Laurance Lake blocks upstream migration of fish near River Mile 1.0 on Clear Branch. The reservoir inundated a stream reach which is considered the best coho and steelhead spawning area in the Middle Fork drainage. The dam isolates a bull trout population, blocks gravel transport to downstream areas (USFS 1996b) and reservoir releases increase downstream temperatures during late summer and fall (Buchanan et al. 1997). A fish trap has been operated at the base of the dam since 1997. The current policy is to release every other native fish (primarily bull trout and cutthroat) entering the trap into stream habitat above the reservoir. Irrigation and power diversion from the Middle Fork Hood River tributaries vary widely by season with an estimated combined peak use of 80 c.f.s. (HRWG 1996). Adult and juvenile fish passage improvements are needed at Coe and Eliot diversion dams. State instream water rights for the Middle Fork Hood River are established but are not reliably met. Timber harvest in Tony Creek has been heavy with 75 to 92 percent of the drainage harvested (USFS 1996c). Tony Creek in-channel wood levels are low and do not meet either Mt. Hood National Forest or Columbia Basin Anadromous Fish Project Implementation Guide (PIG) standards for woody debris density. Nevertheless, pool quality (i.e., depth) is high and pool frequency met PIG standards in three of six reaches.

#### East Fork Hood River

Primary anadromous habitat in the East Fork Hood River drainage includes the East Fork mainstem below Dog River and the lower reaches of Dog River. The average gradient in the mainstem East Fork is 3 percent along the lower 22 miles and 6 percent in lower Dog River. Rapids are the dominant habitat type in the East Fork Hood River, with very poor pool area and frequency. No single substrate type is dominant. Spawning gravel availability does not meet desirable levels per ODFW benchmark values. The upper

tributaries Newton and Clark creeks deliver glacial sand and silt into the East Fork during the glacial melt period. Some headwater streams are subject to natural landslides depositing sediment at their mouths or triggering catastrophic debris flows in the upper East Fork itself. Under historic conditions this drainage was believed to be very productive especially for winter steelhead and coho. Much of the lower East Fork had extensive wetlands along a braided channel where logjams, side channels and continuous riparian forest were common. Lower Dog River and the lower East Fork tributaries are also believed to have had large volumes of instream wood and heavy salmonid use (USFS 1996b). Current habitat quality is affected by channelization, woody debris removal and other historic timber practices, irrigation withdrawal, and natural disturbances.

A large irrigation diversion on the East Fork Hood River was operated unscreened for decades until 1997 following construction of a new screen. Presently, during periods of drought and high irrigation demand, streamflow below the diversion becomes depleted, disconnecting habitat and raising water temperatures downstream. State instream water rights for the East Fork Hood River are established but frequently are not met. One of the most significant man-made habitat disturbances is the confinement of the East Fork channel by State Highway 35. Approximately 7.8 miles of the East Fork Hood River are affected by road construction, reconstruction and bank armoring associated with the highway. Frequent flood damage necessitates chronic roadway maintenance (e.g., rip-rapping). Highway 35 severely limits the channel capacity to handle sediment and debris flows, constraining floodplain processes, shortening stream length and raising water velocities. Streams and wetlands at lower elevations have been channelized, and have been subject to riparian vegetation removal due to livestock impacts, agricultural practices, road construction and other developments (USFS 1996b). Nonetheless, fish managers consider the East Fork Hood River to have a high habitat restoration potential given the accessibility of low-gradient, unconfined areas suitable for large wood placement and reconnection of side channels and wetlands.

#### Hood River Mainstem (Lower Hood River Watershed)

Major habitat areas in this drainage include the Hood River mainstem and Neal Creek, its largest tributary. The Hood River is generally confined between bedrock canyons, hillslopes and terraces. Stream gradient is low and averages 1.2 percent. The most common habitat types in the Hood River are rapids and scour pools with boulder dominating the streambed substrate. Glacial flow increases water turbidity during summer and fall glacial melt periods. Habitat complexity from large woody debris is low and riparian vegetation is generally a mix of hardwoods and shrubs (ODFW 1995). Several reaches surveyed in the mainstem Hood River had pool habitat and pool frequency rated good or “desirable” according to ODFW benchmark values. The average gradient in the anadromous portion of Neal Creek is 7.6 percent. Cascades and rapids are the dominant habitat type while cobble is the dominant substrate type. Riparian vegetation is primarily alder, some conifers and shrubs. Pool area, pool frequency, and in-channel large woody debris levels are generally low in Neal Creek. Habitat quality in Neal Creek has been reduced by road confinement, bank armoring, agricultural and log yard runoff, forest road sediment and the introduction of glacial silt by use of Neal Creek to convey irrigation water of glacial origin.

PacifiCorp’s Powerdale hydroelectric diversion dam is located at river mile 4.5. Up to 500 c.f.s. is continuously diverted from a three-mile bypass reach, subject to minimum



streamflow requirements. A fish ladder outfitted with an adult fish trap operated by ODFW provides passage over the dam. Existing screens in the intake canal do not meet current fish protection criteria (Pribyl et al. 1996) and do not prevent entrainment of juvenile fish. Near river mile 11.0, Farmers Irrigation District diverts 80 c.f.s. from the Hood River for irrigation and power generation. This diversion is currently outfitted with a rotary screen that does not meet current criteria. Elevated pH (8.9 maximum) was measured in the Hood River below Powerdale Dam in May 1995 and June 1996. Elevated nitrogen and phosphorous has been measured in mainstem tributaries; Indian, Whiskey, Neal, Lenz, and Odell Creeks. In spring 1999, the pesticides chlorpyrifos (Neal and Indian creeks) and azinphos methyl (Neal, Indian creeks and lower Hood River) exceeded state standards and EPA criteria (DEQ 1999). Summer water temperatures have exceeded the 64° F state standard for salmonid rearing. Maximum seven day moving averages of 69.3° F in Neal Creek and 67.3° F in the Hood River were calculated from available data.

### **Wildlife**

Wildlife are associated with riverine habitats, riparian forest, wetlands, mixed coniferous and deciduous forest, cliffs, and to a limited extent, agricultural habitats in the Hood River subbasin. Little land is protected or managed specifically for wildlife (e.g., there are no designated wildlife refuges) in the Hood River watershed. The Mt. Hood Wilderness Area, Mt. Hood National Forest lands and The Dalles municipal watershed provide relatively intact and protected habitat areas. Secluded reproductive habitat for wolverine, especially within the Mt. Hood Wilderness is still very viable (USFS 1996b). Prime habitat for pine marten is located in upper elevations along Bluegrass Ridge to the upper Pollalie and Tilly Jane subwatersheds. Pocket Creek, Bluegrass Ridge and the Mt. Hood Meadows area provide high quality summer range for deer and elk. Surveyors Ridge, a prominent 20 mile north-south ridge line, is one of the few known raptor migration corridors in the Cascades. Waterfowl use the open water of the Bonneville Pool, with some nesting along shoreline and on island habitat. Although habitat quality varies by location, habitat has generally been lost or degraded throughout much of the watershed by past and present land management, hydropower development on the Columbia River, the spread of non-native plant species and urban/rural residential expansion. The winter range of large migratory animals in the Hood River valley floor has been usurped by human habitation (Wells 1999). Half the remaining winter range of deer and elk in the county is on private land. These areas have been roughly delineated by ODFW and are shown in Figure 9.

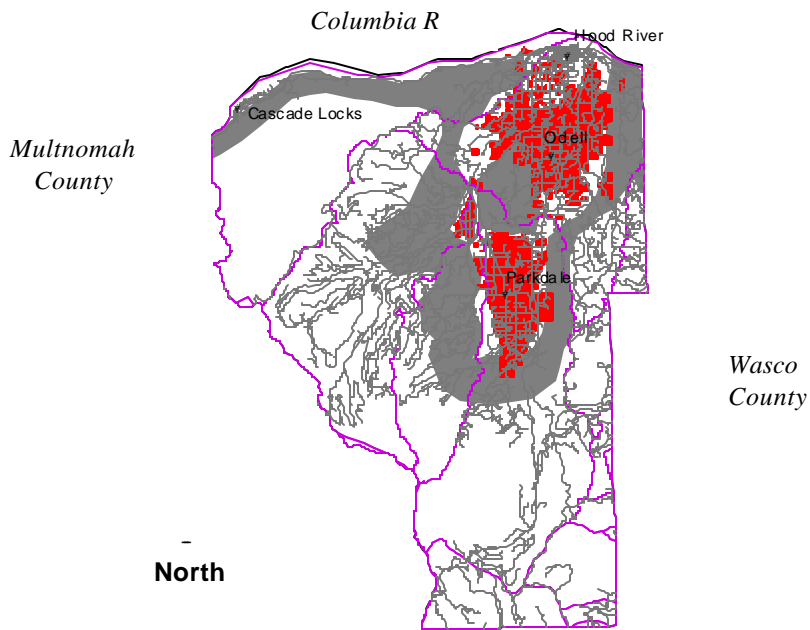


Figure 9. Approximate remaining deer and elk winter range habitat (shaded green) in Hood River County (outer purple line) and roads. Areas shaded red are agricultural tracts. Inner purple lines delineate major drainage boundaries

Widespread agricultural and residential development has displaced low elevation conifer forest shelter for resident birds and mammals generally, especially in winter. Dead, dying and downed trees for nesting, scanning perches and insect-feeding substrate for birds and other wildlife are absent in most orchards and rural residential properties. Only fragmented forest patches remain among cultivated and developed lands in the Hood River Valley. In many areas, streamside vegetation is the last stronghold of native plant form and function in the Hood River Valley (Wells 1999). Former lowland, riparian and riverine habitats at the Hood River confluence with the Columbia River have been altered by dredging, diking and fill as well as flow regulation at Bonneville and The Dalles dams. Other hydroelectric development activities have affected wildlife. For example construction and maintenance of power transmission corridors has altered vegetation and increased access to and harassment of wildlife. Tansy ragwort, knapweed, scotch broom and other noxious weeds have become established in the watershed.

Fragmentation and poor connectivity of mature forest habitat was identified as the primary wildlife issue in the U.S. Forest Service watershed analyses for the Hood River area. Migration across the watershed is likely affected by Highway 35 and valley development. The Hood River Valley is a barrier to movement between east side and west side late seral forest habitats. Habitat linkages for species associated with riparian areas and/or mature forest below 3,000 feet is severely limited by land use. Deer and elk migrate along Bluegrass Ridge and lower Cooper Spur, crossing state Highway 35 and moving east up into upper Puppy Creek and Dog River. Some individuals are killed on Highway 35. Harassment due to road access and poaching is noted as significant (USFS 1996b).

### **Watershed Assessment**

Several recent reports characterize the Hood River watershed and its fish and wildlife resources. The Mt. Hood National Forest has completed Watershed Analysis reports for the West Fork Hood River (USFS 1996a), the East Fork Hood River and the Middle Fork Hood River (USFS 1996b). These reports describe historic and existing aquatic and terrestrial habitat, outline desired future conditions, and present key issues and recommended actions.

A Federal Energy Regulatory Commission (FERC) relicensing application was submitted by PacifiCorp in 1998 for the Powerdale Hydroelectric Project. The relicensing process has led to the accumulation of fish and wildlife information for the Hood River project area including fish passage, instream flow requirements and water quality (PacifiCorp 1998).

The Hood River Watershed Group (watershed council) prepared a Watershed Assessment (HRWG 1999) for the Hood River Subbasin. The assessment used the Oregon Watershed Assessment Manual (Watershed Professionals Network 1999 and its earlier draft versions) to classify channel habitat types, identify factors limiting fish production and outline data gaps.

A number of reports that contain assessment-type information were prepared as a result of Columbia Basin System Planning and the ongoing Hood River Production Program. The Hood River Subbasin Salmon and Steelhead Production Plan (ODFW and CTWSRO 1990) described the subbasin environment, water resources, land use, habitat protection needs and production constraints for anadromous fish. The Hood River Production Master Plan characterized subbasin environmental problems and habitat rehabilitation efforts and included an assessment of genetic risk and resident fish interactions (O'Toole and ODFW 1991). The Draft Environmental Impact Statement (DEIS) for the Hood River Fisheries Project described subbasin water resources, resource use and management, anadromous and resident fish status, habitat condition and carrying capacity (BPA 1996).

A substantial amount of stream habitat survey work has been completed. ODFW Aquatic Inventories Project stream surveys were conducted in 63 anadromous stream miles in the Hood River watershed between 1992 and 1994. ODFW analyzed the data collected to assess riparian and stream channel conditions and produce a summary report (ODFW 1995). The U.S. Forest Service has collected habitat survey information on over 155 miles of anadromous, resident and non-fish bearing streams within National Forest boundaries within the Hood River watershed, but this survey information has not been summarized into a single report.

The Natural Heritage Program maintains a database on wildlife habitats and species occurrence throughout Oregon. The Oregon Trust Agreement Planning Project (BPA 1993) and Oregon Gap Analysis Project (ODFW 1997) identified gaps in biodiversity and terrestrial habitat restoration needs and prioritized potential habitat restoration opportunities within Oregon, including the Hood River Subbasin.

A loss assessment was conducted in 1990 to quantify wildlife and wildlife habitat impacts caused by the development of Bonneville Dam (Rasmussen and Wright 1990). Wildlife mitigation goals and objectives for the Hood River Subbasin are based on this loss assessment. Loss assessment results were amended into the Northwest Power Planning Council Fish and Wildlife Program as accepted wildlife losses. Losses were measured in Habitat Units (HUs) for selected target/indicator species and linked to priority habitats.

## Limiting Factors

### Fish

Key factors limiting anadromous and resident fish production in the Hood River subbasin identified in the Hood River Watershed Assessment (HRWG 1999), the U.S. Forest Service Watershed Analyses (USFS 1996a; USFS 1996b), and the Hood River Habitat Protection, Restoration, and Monitoring Plan (CTWSRO 2000) are (1) artificial migration barriers including inadequately screened diversions; (2) low habitat complexity including a lack of pool habitat, in-channel large wood structure and spawning gravel and reduced stream-floodplain interactions compared to historic conditions and (3) water quality degradation and low summer flows. Other important constraints on subbasin habitat productivity are low anadromous returns and natural physical characteristics, i.e., steep stream gradients, glacial turbidity, disturbance events such as mudflows, high peak flow patterns (O'Toole and ODFW 1991) and limited floodplain area (HRWG 1999).

Maintaining and improving passage for adult and juvenile salmonids was noted as a primary habitat protection objective in the Columbia Basin System Planning Hood River Subbasin Salmon and Steelhead Production Plan (ODFW and CTWSRO 1990). Inadequate fish screens and artificial barriers impede fish migration at a number of water diversions and road culverts (HRWG 1999; ODOT and ODFW 1998). Known locations of fish passage problems are shown in Figure 10. These problems restrict upstream salmonid distribution and habitat utilization in the subbasin, increase mortality of migrating juveniles and smolts and may elevate pre-spawning mortality. The prompt replacement of existing inefficient screens at the Powerdale Hydroelectric Project diversion is especially urgent due to its downstream position (RM 4.5) and the large volume of flow diverted (HRWG 1999).

Historic timber harvest including extensive splash damming and stream clean out has resulted in fish habitat with fewer pools, fewer pieces of instream wood, less variation in water velocity, and substrate sizes that had supported former fish population abundance (USFS 1996a; USFS 1996b). The loss of natural wood supply in stream channels has resulted in greater flood velocities, less interaction between streams and floodplains, a deficiency of pool habitat, side channels, or other lateral early-rearing or over-wintering habitats. The current lack of in-channel wood structure and low velocity stream habitat has severely reduced gravel retention and deposition - particularly in the low-water channel where it is needed for fall spawning (HRWG 1999).

Water diversions can reduce summer low flows at several locations to the point where surface flow is depleted resulting in disconnected habitat, impeded migration and higher stream temperatures. Nutrient enrichment, elevated pH, and pesticide contamination in the lower stream elevations and in the lower mainstem are of increasing concern as potential limiting factors.

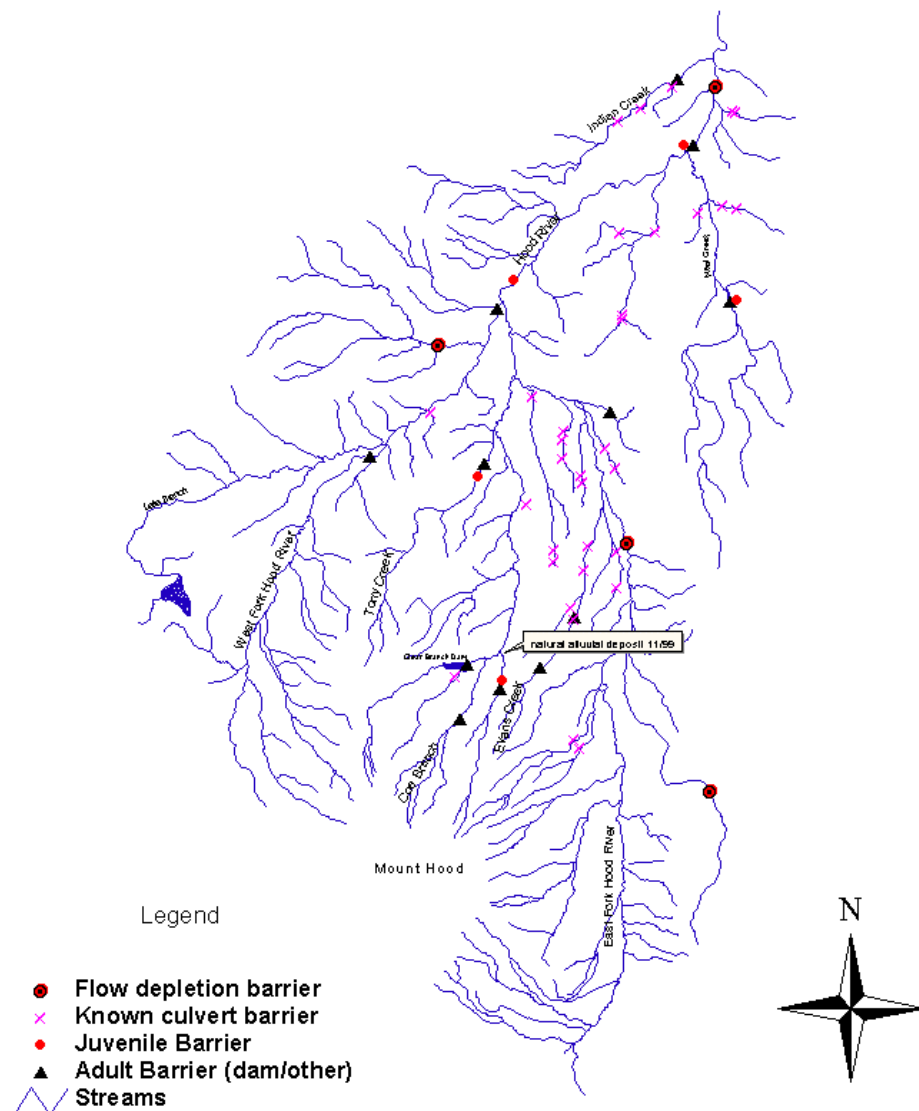


Figure 10. Locations of known fish passage problems in the Hood River watershed.  
Sources: ODOT and ODFW 1998; HRWG 1999

#### Wildlife

The abundance of some wildlife species has been affected by habitat loss and degradation due to past hydropower development, agricultural and other land use and the spread of non-native plant species and exotic animals. Increasing residential development in the Hood River Valley and forest lands continues to degrade, fragment or eliminate remaining wildlife habitats and increase potential conflicts between humans and big game species. Encroachment into wintering range for deer and elk has occurred due to conversion of

forest to orchard and residential or other development. Off the National Forest, elk presence in particular conflicts with orchard production and is discouraged by ODFW by depredation hunts (USFS 1996a). Low anadromous fish escapement results in a loss of carcass biomass with a negative effect on wildlife abundance. Opportunities to restore populations and protect wildlife habitat will diminish over time as land prices and development pressures rise.

### **Artificial Production**

A number of facilities in the watershed support ongoing spring chinook and steelhead supplementation under the BPA-funded Hood River Production Program. The two main facilities are the Powerdale Adult Fish Trap operated by ODFW and the Parkdale Fish Facility operated by the CTWSRO. Winter and summer steelhead and spring chinook broodstock are collected at Powerdale Adult Fish Trap (Hood River RM 4.5). The Parkdale Fish Facility (Rogers Spring, Middle Fork Hood River) is equipped for adult holding, spawning, early incubation and smolt acclimation. Round Butte and Oak Springs hatcheries in the Deschutes River Basin are used for incubation and rearing. The Pelton Ladder in the Deschutes River Basin is used for spring chinook rearing. Temporary ponds at three upriver sites, e.g., fiberglass circular tanks or rigid lined raceways are used for smolt acclimation in the Hood River. A concrete bay in the East Fork Irrigation District diversion facility is used as a raceway to acclimate winter steelhead in cooperation with the District. Hatchery and Genetics Management Plan (HGMP) information for the Hood River subbasin is included separately in Appendix 1- HGMP Spring Chinook and Appendix 2 - HGMP Steelhead.

### **Existing and Past Efforts**

Efforts Funded by BPA through the Columbia Basin Fish and Wildlife Program

#### **Hood River Production Program**

The Hood River Production Program (HRPP) was initiated in 1991 as a mitigation measure for Columbia River hydrosystem impacts on anadromous fish. The program consists of supplementation, monitoring and evaluation and habitat improvements jointly implemented by CTWSRO and ODFW. Program goals are to:

- Reestablish a natural self-sustaining spring chinook salmon population in the Hood River subbasin using Deschutes River stock;
- Rebuild naturally self-sustaining runs of summer and winter steelhead;
- Maintain the genetic characteristics of wild anadromous populations;
- Protect high quality habitat and restore degraded fish habitat and
- Contribute to tribal and non-tribal fisheries, ocean fisheries and the Northwest Power Planning Council (NWPPC) interim goal of doubling Columbia Basin salmon runs.

Currently, 125,000 spring chinook, 30,000 summer steelhead and 60,000 winter steelhead smolts are released annually. Broodstock are collected at Powerdale Dam Fish Trap and held at the Parkdale Fish Facility. Incubation and rearing occurs primarily at Round Butte Hatchery and/or rearing facilities on the Deschutes River. Smolts are acclimated in the Hood River at upriver sites and volitionally released. Monitoring and evaluation includes adult and juvenile migrant trapping, life history data collection and bio-sampling, creel

surveys, spawning surveys, electrofishing, adult radiotracking and genetic sampling (BPA 1996). Carcasses, when available, are distributed in the upper watershed to benefit the aquatic and terrestrial food chain. Early action habitat projects have consisted of riparian livestock fencing, fish passage remediation, water quality monitoring and habitat assessment. BPA-funded actions in support of the HRPP to date have included:

1. Project No. 8805307-08 - Powerdale, Parkdale, and Oak Springs O&M
2. Project No. 8902900 - Production project for spring chinook
3. Project No. 9500700 - O&M for spring chinook rearing at PGE Pelton Ladder
4. Project No. 8805303 - Monitoring and evaluation - CTWSRO
5. Project No. 8805304 - Monitoring and evaluation - ODFW
6. Project No. 9802100 - Habitat improvement projects - CTWSRO (*listed below*)

**Results and Accomplishments of the Hood River Production Program (HRPP):**

Supplementation activities in the HRPP are experimental and in a relatively early stage. A genetics study is being designed to examine the key question of whether supplementation to date in the Hood River has been an effective tool in rebuilding native and/or natural salmon and steelhead populations. In the interim, the co-managers have continued to make adjustments to increase the protection of native steelhead stocks and improve program effectiveness in response to monitoring and evaluation. Matrix spawning, scale verification and collection of hatchery broodstock from throughout the run timing have been implemented to maintain natural genetic variability. Catch and release sport fishing regulations for wild steelhead were instituted in the Hood River in 1992. The use of Big Creek and Skamania steelhead stocks as hatchery broodstock was discontinued in favor of using wild Hood River steelhead for Hood River releases. This was initiated in the 1992-3 run year for winter steelhead and the 1997-8 run year for summer steelhead. Access to upstream spawning habitat for any out of basin hatchery returns has been closed at the Powerdale Fish Trap since 1998. Despite a desire to phase out use of Deschutes spring chinook and develop a locally-adapted Hood River broodstock, no spring chinook broodstock were taken from the Hood River in 1998 and 1999 because of low returns. Instead, all natural and subbasin hatchery returns were passed above Powerdale Dam to spawn naturally. An emergency spring chinook fishing closure was implemented in the Hood River below Powerdale Dam in 1999 and 2000 to assist spring chinook reintroduction objectives. Based on research conducted at the Warm Springs National Fish Hatchery, steps continue to be taken to improve the health and smolt-readiness of spring chinook smolts released into the Hood River, including lower rearing temperatures and densities. Juvenile migrant trap data showed that acclimated steelhead smolts had much higher in-river migration survival than smolts directly released in the Hood River (Figures 11 and 12).

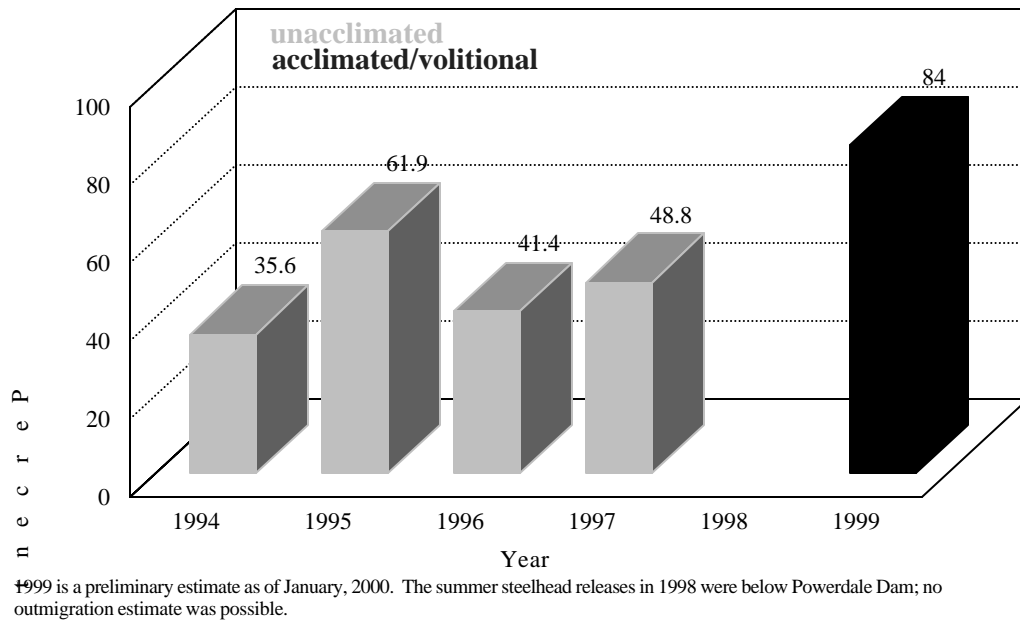


Figure 11. Comparison of outmigration survival of hatchery summer steelhead smolt releases in the Hood River to Powerdale Dam, 1994 to 1999

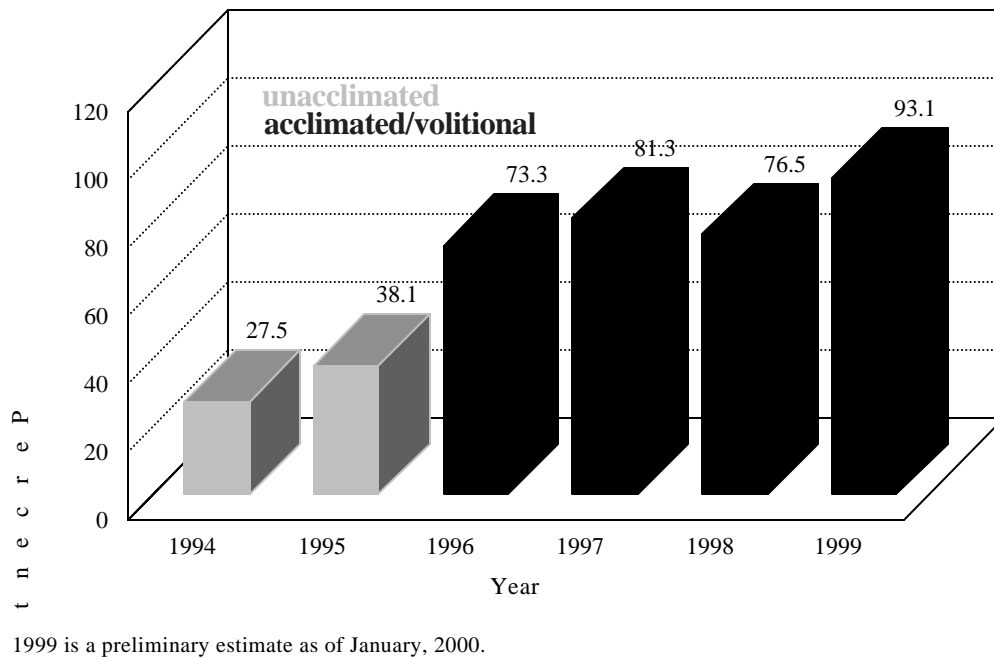


Figure 12. Comparison of outmigration survival of winter steelhead hatchery smolt releases in the Hood River to Powerdale Dam, 1994 to 1999

The number and distribution of acclimation sites has been increased from two to four sites using smaller groups of smolts and lower densities. Acclimation ponds use



hanging woody debris and/or camouflage paint to mimic a stream environment. Smolts that do not emigrate volitionally are trucked downstream to the Columbia River.

**Habitat projects completed under Project No. 9802100:**

1. Planning: Cost-share assistance for Hood River watershed assessment and Hood River Watershed Council activities 1998 - present.
2. Planning: The Hood River Fish Habitat Protection, Restoration, and Monitoring Plan was drafted in 1999 to identify strategies or actions to protect productive habitat; propose projects to improve degraded habitat and indicate relative priorities.
3. Fish Passage: An adult fish passage project was completed in 1999 to eliminate a diversion dam barrier in Tony Creek at RM 0.7 and improve access to three miles of anadromous and resident habitat.
4. Fish Passage: An engineering study was completed in 1998 to evaluate options to address fish passage at the East Fork Irrigation District diversion on Neal Creek at RM 5.0. Current selection is for an invert pipe siphon that eliminates use of the diversion altogether. Final design and construction is scheduled for 2002.
5. Fish Passage: A small diversion dam and pond was breached on Evans Creek restoring access to 1.5 miles of habitat for winter steelhead and resident trout and allowing a more natural channel configuration. Plans exist to remove two more dams on Evans Creek
6. Fish Passage: Replacement of fish screen facilities on Hood River 80 c.f.s. Farmers Irrigation Canal diversion intake at RM 11.0 scheduled for summer 2000
7. Fish Passage: Annual inspection and maintenance of Punchbowl Falls fish ladder
8. Instream Habitat Diversity and Quality: Year-round flow was restored in 1999 to a 3500 foot long abandoned side channel in the East Fork Hood River near RM 3.0 on private land. In 1999 and 2000, two and five steelhead redds were found in the restored channel, respectively.
9. Riparian/Water Quality: Since 1996, riparian livestock fence was installed along 2.5 miles of anadromous stream on private land (Neal, Lenz, and Baldwin creeks), and 350 feet of eroding streambank was bio-engineered. Over 600 conifers and 400 willow/dogwood were planted by volunteers with a mean survival of 80 percent and 30 percent, respectively.
10. Riparian/Water Quality: Cost-share assistance for ongoing 2000-2001 pesticide monitoring and bioassay study in Hood River tributaries -- CWA 319 grant

**Other Projects Funded by BPA**

The US Forest Service Hood River Ranger District completed nine woody debris placement projects in the West Fork Hood River drainage using BPA funds between 1984 and 1993. Five of these were in Lake Branch, two in McGee Creek, and two in the upper West Fork Hood River.

### **Efforts Funded Outside of the BPA Fish and Wildlife Program**

#### **Adult Fish Passage**

- 1957 - ODFW constructed a fish ladder at Punchbowl Falls in W. Fork Hood R. near RM 0.2
- 1966 - Hines Dam breached on East Fork Hood River
- 1985 - ODFW constructed concrete weirs to improve adult passage at Moving Falls near RM 3.7 in the West Fork Hood River
- 1996- Improvements in fish ladder attraction flow at PacifiCorp Powerdale Dam (RM 4.5) and powerhouse tailrace reconfiguration to reduce migration delay
- 1997 - An adult fish trap is operated at the base of the impassible Clear Branch Dam since by the Forest Service and ODFW in cooperation with Middle Fork Irrigation District
- 1998 - Oregon Department of Transportation and ODFW culvert survey of state and county owned nonforest roads ranked 18 of 46 problem culverts as medium in priority for remediation, with none ranking as high priority
- 1999 - USFS removed a culvert from Pinnacle Creek to improve bull trout passage near RM1.0

#### **Juvenile Fish Passage**

- 1995 to present -Farmers Irrigation District (FID) eliminated 18 small unscreened diversions at various points in the West Fork and Hood River drainages, installing screens on all 16 remaining diversions, some of which need further upgrades.
- 1996 - The 113 c.f.s. East Fork Hood River diversion near RM 9.5 was screened by the East Fork Irrigation District and began operating in 1997 and is expected to significantly increase salmonid production in the East Fork.
- 1999 - Screen and fish return bypass improvements were constructed by ODFW in the West Fork Hood River at the Dee Irrigation Diversion near RM 6.0.
- 1999 - ODFW continues to work towards the proper screening of water diversions throughout the subbasin. ODFW inventoried all diversions including small pumps to assess upgrades needed to meet current protection criteria. A report is being prepared.
- Summer 2000 - Farmers Irrigation District will replace a rotary screen in its 80 c.f.s Hood River diversion canal near RM 11.0 with a horizontal screen meeting current criteria. *Note: partial funding under BPA Project No. 9802100 as described above.*

#### **Powerdale Dam FERC Relicensing**

PacifiCorp's current license for the Powerdale Hydroelectric Project expired in March 2000 and is operating under a temporary license. A new license is expected to be issued by FERC within the next few years. Project mitigation will include fish screen replacement and higher April to October minimum instream flow requirements in the bypass reach. It is believed that these mitigation measures will substantially improve juvenile and adult migration survival for anadromous fish.

#### **Instream, Floodplain and Riparian Habitat Restoration**

ODFW Salmon and Trout Enhancement Program volunteers assisted with several projects to improve spawning and rearing habitat in the 1980s. Rock structures and log deflectors

were placed in Neal, Tony and Clear Branch creeks. Since 1983, habitat structures, mostly cabled logs, have been placed in Lake Branch, lower Greenpoint, Clear Branch, upper East Fork and West Forks of the Hood River and a levee was set back on Robinhood Creek by the U.S. Forest Service. To date, 29 of a total of 38 reaches have been treated by the Forest Service using non-BPA funding sources. Such instream and riparian projects are monitored to assess effectiveness and improve the design of future projects in meeting objectives. The U.S. Forest Service has provided interdisciplinary technical and other assistance for similar projects on non-federal lands.

Farmers Irrigation District placed 180,000 board feet of large woody debris at 12 sites and planted 6,600 trees along riparian areas in Green Point Creek in 1995. Additional wood placement is planned for summer 2000. During 1999, Longview Fibre Company treated 3,000 feet of the West Fork Hood River, installing five structures 90 pieces of large woody debris in consultation with ODFW and Oregon Department of Forestry.

Oregon Department of Forestry regulates forestry activities per the Oregon Forest Practices Act that affect riparian habitat quality.

Oregon Department of Transportation has agreed to investigate removal of dike fill material from the East Fork Hood River channel along a section of Highway 35 to help assess potential habitat benefits and costs. Numerous opportunities and needs for instream and riparian habitat restoration and protection remain within the subbasin.

#### **Upland Habitat Protection and Restoration**

The U.S. Forest Service is managing lands according to forest management plans which specify a forest road density goal of under 2.5 miles per square mile. This density is designed to protect wildlife, but is assumed to protect aquatic habitat as well. As a result, road density on national forest land will eventually be reduced in those areas where it exceeds 2.5 miles per square mile. Several roads have been closed to reduce sedimentation and others obliterated. On the Mt. Hood National Forest hydrologic recovery goals are identified for each subwatershed that limit forest canopy openings to control cumulative risks of timber harvest activities on aquatic habitat, primarily aggravated rain on snow flood damage. As funding allows, the USFS seeks to upgrade road drainage systems to reduce sediment runoff and landslide potential.

In summer 2000, Hood River County Forestry Department, with oversight from the Oregon Department of Forestry and ODFW, will complete a forest road problem inventory on County-owned lands and adjacent private land to identify fish passage, sedimentation and drainage problems in need of remediation.

Oregon Department of Forestry regulates forestry activities per the Oregon Forest Practices Act to address slope failures, road construction and maintenance standards and other aspects affecting uplands.

#### **Bull Trout Conservation Plan**

A bull trout conservation plan is being prepared for the Hood River watershed with participation from various entities. ODFW is serving as lead author with funding from the USFWS. The plan will address current population status, factors limiting production and suggest projects and management actions to restore bull trout populations in the watershed.

#### **Hood River Watershed Action Plan**

Based on the 1999 Watershed Assessment, a Watershed Action Plan in 2000-1 will be prepared by the Hood River Watershed Group (HRWG) with support from the Oregon Watershed Enhancement Board (OWEB). The HRWG is a locally formed watershed council currently supported by a Oregon Watershed Enhancement Board grant and a cost-share contribution from BPA through the Confederate Tribes Warm Spring Reservation Oregon (CTWSRO) (BPA Project No. 980210). The Action Plan will prioritize and recommend restoration, public education, and investigation projects under guidance from state, federal and tribal experts. Those projects described in the Habitat Protection, Restoration and Monitoring Plan referenced above will be identified as anadromous or resident fish priorities of ODFW and CTWSRO incorporated into the local Watershed Action Plan.

#### **Wildlife Habitat Measures**

Wildlife surveys and inventories are periodically conducted by U.S. Forest Service (USFS), CTWSRO, and ODFW. Deer and elk radio collar studies are ongoing to confirm winter and summer ranges. Research regarding the status of wolverines is being conducted by the USFS as is an effort to identify whether lynx are present in the Cascades.

As yet, no site-specific wildlife mitigation projects have been funded by BPA in the Hood subbasin. Only about 10 percent of Habitat Unit losses as a result of Bonneville Dam construction have been mitigated. The Oregon Wildlife Coalition is implementing a programmatic mitigation project *Securing Wildlife Mitigation Sites: Oregon (Project No. 9705900)*, that could implement wildlife mitigation projects within the Lower Mid-Columbia Subregion including the Hood River subbasin. The goals of this project are to (1) fund coordination activities to identify, plan, propose and implement wildlife mitigation projects; (2) prioritize potential mitigation projects; (3) acquire or ease lands with priority habitats; (4) enhance acquired or eased lands through alteration of land management practices, active restoration; control of noxious weeds, control of public access, etc. to benefit target/indicator species and priority habitats and (5) develop and implement a monitoring and evaluation plan. One project, *Securing Wildlife Mitigation Site: Oregon - Mitchell Point (Project No. 9705909)*, was recommended by the Northwest Power Planning Council for funding in FY 1999 but has not yet been implemented. Opportunities for private and public landowners, as well as non-profit organizations (e.g., land trusts) to work together to benefit wildlife and wildlife habitat in the subbasin by protection and enhancement of lands for wildlife.

Currently, 23 invasive plant species are targeted for control or eradication by the Hood River County Weed and Pest Division, which uses Integrated Pest Management techniques to control noxious weeds, combining biological controls, herbicide use and mechanical mowing or removal. Hood River County serves as a coordinating agency and contracts with BPA, Oregon State Parks, Oregon Department of Transportation, the U.S. Forest Service and others to control noxious weeds in the watershed.

#### **Water Quality Monitoring and Improvement**

PacifiCorp collected water quality data in the Hood River Powerdale Hydroelectric Project Area and lower tributaries in 1995 and 1996. DEQ and PacifiCorp anticipate continuing pH sampling to better assess pH standard violations previously observed in the bypass

reach. Baseline monitoring of D.O., pH, turbidity, temperature and nutrients was conducted in 1997 and 1998 by Hood River Watershed Group (HRWG) volunteers.

DEQ maintains an ambient monitoring site at the mouth of the Hood River. In 1998, DEQ formed a local Water Quality Technical Committee and conducted intensive baseline monitoring at 39 sites in the Hood River watershed to prepare for a Total Maximum Daily Load (TMDL) allocation plan. DEQ plans to develop a TMDL for temperature in 2000 to address stream segments where temperature standards are not met. The Oregon Department of Agriculture and the Hood River Soil and Water Conservation District began a Hood River Agricultural Water Quality Management Area Plan with a local advisory committee in 1999. This plan will outline required conditions and voluntary management practices to reduce agricultural pesticide, nutrient, sedimentation and temperature problems in fulfillment of Clean Water Act and Oregon State Senate Bill 1010 requirements.

Samples taken at six sites during March, April and June 1999 were analyzed for organophosphate pesticides in a pilot study initiated by DEQ, Oregon State University Cooperative Extension, and the Hood River Grower Shippers Association. Based on the results, pesticide monitoring is being continued under a CWA 319 grant with assistance from BPA funding. A local education effort is planned to help reduce pesticide contamination in streams.

DEQ conducted mixing zone studies of fruit packing plant discharges in Lenz, Neal, Odell and Emil creeks between 1992 and 1999 for NPDES discharge permit renewal. Similarly, mixing zone studies were conducted at wastewater treatment plants in Odell and Trout creeks and the upper East Fork at Mt. Hood Meadows Ski Resort in 1998. Other water quality monitoring activities are ongoing, particularly continuous temperature monitoring by the HRWG, USFS, CTWSRO, and irrigation districts.

#### **Instream Flow Restoration**

Investments in capital improvements and education to increase irrigation system and water use efficiency are ongoing in the watershed. Such improvements can eliminate canal failure risks, eliminate leakage, reduce sediment input to streams, produce operational and economic benefits, and create opportunities for streamflow restoration.

The Farmers Irrigation District prepared a water conservation plan in 1995 (FID 1995) approved by Oregon Water Resources Department. Sixty percent of the Districts' original canal and ditch line has been converted to pressurized pipe, returning 2,535 supplemental and 115 primary water right acres to instream flow (FID 2000). A conservation education and technology program for residential irrigation resulted in 35 percent of these customers converting to micro-sprinklers with meters or gauges - cutting water use by up to 300 percent in some instances. Soil moisture sensors were installed by 30 percent of District growers for more accurate determination of orchard irrigation requirements. The District established a program to annually adjust water rights to match actual water use, installed 15 telemetry sites to monitor streamflow and diversions, adopted minimum flow standards for Green Point Creek and plans to increase summer streamflow from an average of 9 c.f.s. to 14 c.f.s. Future improvements will save an estimated 20,000 acre-feet during the irrigation season. FID intends to return this water to the West Fork and Hood River (FID 1995).

The Middle Fork Irrigation District (MFID) has ongoing efforts to increase the

water conservation efficiency of their delivery and distribution system and has replaced most of its open ditch and old wood stave pipelines with pressurized pipe. The MFID would like to eliminate its diversions from several East Fork tributaries provided that a mechanism is developed to prevent loss of priority. Thirty-eight miles of the East Fork Irrigation District (EFID) system remain as open unlined ditches and canals. The EFID continues to install pipe as its finances allow. It is believed that converting more open canals to pipe, together with increased orchard water use efficiency, would reduce enough leakage to provide a minimum instream flow in the East Fork Hood River below their diversion.

In 1997, upgrades to the City of Hood River Cold Springs municipal diversion restored 4 c.f.s. into Lake Branch. Prior to the upgrades, this water was spilled 15 miles downstream. Similarly, continuous monitoring equipment was installed in 1999 at the City of the Dalles Dog River diversion which allow the City to better control diversions to match water demand and reservoir refill needs, resulting in flow restoration of up to 9 c.f.s. in winter and spring months. The Natural Resources Conservation Service, Oregon State University, Hood River Grower Shippers Association, the Hood River Soil and Water Conservation District and Farmers Irrigation District promote through various programs the use of soil moisture sensors and micro-sprinkler technology to increase orchard irrigation efficiency. Approximately 10% of growers overall currently use soil moisture sensors.

#### **Fish and Wildlife Enforcement**

Oregon State Police (OSP) enforces fishing and hunting regulations in the Hood River subbasin with special attention to ESA-listed salmonids. OSP develops annual action plans to focus enforcement effort in specific areas and resource priorities as identified by ODFW. Action plan results tabulated for 1999 are shown in Table 44. OSP troopers provide briefings and participate in Hood River Watershed Group meetings to increase awareness of enforcement activities. In April 1998, the Oregon Fish & Wildlife Commission closed the Hood River above Powerdale Dam to all salmon and steelhead angling, while the West Fork Hood River was closed to trout angling to protect smolts. Special angling regulations are in effect in Laurance Lake to protect bull trout.

Table 44. Oregon State Police fish and wildlife action plans in effect for the Hood River-1999 results. Sources: McNerney, 1999a; McNerney, 1999b, Anderson, 1999

<b>1999 Results</b>	<b>General</b>	<b>Enforcement Action Plans</b>		
	<b>Hood River Drainage</b>	<b>Hood River Salmon/Steelhead /Bull Trout</b>	<b>Laurance Lake Bull Trout</b>	<b>Sensitive Hunt Boundary Issue</b>
Total Contacts	998	167	465	43
Total Citations	-	28	47	10
Total Warnings	252	45	68	3
Compliance Rate	-	76.5%	75%	70%
Hours Worked	2326	148.5	130	50

The Columbia River Inter-Tribal Fisheries Enforcement (CRITFE) monitors fisheries and enforces fishing regulations in the Columbia River between Bonneville and McNary Dams, including closures around the mouth of the Hood River. Half of the CRITFE budget is funded by BPA. Some data suggest that CRITFE acts as a deterrent force to reduce illegal harvest in the CRITFE patrol area. Between 1991 and 1997, the number of tribal fishing gear seizures and arrests were reduced by approximately 60 percent. During the same period, patrol effort increased by 70 percent with support from BPA. In fishery-specific instances, compliance with all regulations by tribal fishers is nearly 100 percent (Johnson, CRITFE *pers. comm.*). Results of CRITFE patrols for the West Bonneville Pool are shown in Table 5.

Table 5. Columbia River Inter-Tribal Fisheries Enforcement activity results for 1999 in the West Bonneville Pool which extends upstream to the Hood River -Washington Bridge.  
Source: J. M. Ekker, CRITFE, *pers. comm*

Activity	Results
Vehicle patrol hours	2,593
Boat patrol hours	418
Citations	46

## Subbasin Management

### Existing Plans, Policies, and Guidelines

Major plans, policies, regulations and guidelines that focus on protection of streams, wildlife habitat, fish and other aquatic life in the Hood River subbasin are described briefly below. While effectiveness in implementing these plans, policies and regulations varies, efforts to increase inter-agency coordination and cooperation are being made in the subbasin. Improved implementation of all of these plans, policies, regulations and guidelines are essential to the success of all fish and wildlife efforts, including BPA-funded fish and wildlife projects.

### Federal

The U.S. Forest Service (USFS) manages just over half of the Hood River Subbasin. Land allocation, management standards, and guidelines for the subbasin are specified in (1) Mt. Hood National Forest Land and Resource Management Plan (USFS 1990) and (2) the Northwest Forest Management Plan Standards and Guidelines for Management of Habitat for Late Successional and Old-Growth Forest Related Species Within the Range of the Northern Spotted Owl (1994 Northwest Forest Plan). The 1994 Northwest Forest Plan includes an *Aquatic Conservation Strategy* (ACS) to maintain and restore the health of watersheds and aquatic ecosystems on public lands. Its four components (riparian reserves, key watersheds, watershed analysis and watershed restoration) are designed to operate together to maintain and restore the productivity and resiliency of riparian and aquatic ecosystems on federal lands. All proposed and existing USFS activities in the subbasin are designed to meet the intent of the ACS objectives. The lower three miles of the subbasin

are in the Columbia River Gorge National Scenic Area. Certain land development activities within the Scenic Area boundary are reviewed for consistency with the Columbia River Gorge National Scenic Area Management Plan (199?). 2).

The U.S. Fish and Wildlife Service administers the Endangered Species Act (ESA) for resident fish. The National Marine Fisheries Service administers the ESA as it pertains to anadromous fish. These agencies review and comment on activities that affect fishery resources and develop recovery plans for listed species in the subbasin.

The Natural Resource Conservation Service (NRCS) provides technical support to the Hood River Soil and Water Conservation District and agricultural landowners and distributes federal cost-share monies to reduce soil erosion, other contaminants and increase agricultural production on private lands. The NRCS assists landowners to develop farm conservation plans and provides engineering and other support for habitat protection and restoration.

The US Environmental Protection Agency is responsible for implementing the Clean Water Act including approving Total Maximum Daily Load plans developed for the Hood River, now in progress.

#### Tribal Government

The Confederated Tribes of the Warm Springs Reservation of Oregon (CTWSRO) is responsible for protecting and enhancing treaty fish and wildlife resources and habitats for present and future generations. Members of the CTWSRO have federally reserved treating fishing and hunting rights pursuant to the 1855 Treaty with the Tribes of Middle Oregon and affirmed in *United States v. Oregon*, 1974. CTWSRO co-manages fish and wildlife with ODFW and jointly implements BPA-funded Hood River Production Program activities including acting as lead in habitat-related projects and planning activities. In addition, CTWSRO reviews and comments on development proposals relative to the protection of treaty fish and wildlife resources within the subbasin.

The *Wy-Kan-Ush-Mi Wa-Kish-Wit: Spirit of the Salmon* (Columbia River Inter-Tribal Fish Commission, CRITFC 1995) makes institutional and technical recommendations for the Columbia Basin and presents a Hood subbasin plan calling for fish screen improvements and continued habitat projects, Hood River Production Plan supplementation, monitoring and evaluation, enforcement of water quality standards and instream flow restoration.

#### State Government

Oregon Department of Fish and Wildlife (ODFW) is responsible for protecting and enhancing Oregon fish and wildlife and their habitats for present and future generations. ODFW co-manages fishery and wildlife resources together with the CTWSRO and jointly implements the BPA-funded Hood River Production Program. Management of fish and wildlife and their habitat in the Hood River subbasin is guided by ODFW policies and federal and state legislation. ODFW policies and plans applicable to the subbasin include the *Natural Production Policy* (OAR 635-07-521 to 524), *Wild Fish Management Policy* (OAR 635-07-525 to 538 ), *Oregon Guidelines for Timing In-Water Work to Protect Fish and Wildlife Resources* (ODFW 1986) and *Hood River Subbasin Salmon and Steelhead Production Plan* (ODFW & CTWSRO 1990). These plans present systematic approaches



to conserving aquatic resources and establishing management priorities within the subbasin.

Passed into law in 1997, *Oregon Plan for Salmon and Watersheds* and the *Steelhead Supplement to the Oregon Plan* (1998) outlines a statewide approach to ESA concerns based on watershed restoration and ecosystem management to protect and improve salmon and steelhead habitat in Oregon. The Oregon Watershed Enhancement Board facilitates and promotes coordination among state agencies, administers a grant program and provides technical assistance to local Watershed Councils and others to implement the Oregon Plan.

The Oregon State Police patrols the subbasin to enforce laws and regulations designed to protect fish and wildlife. Specific area and resource protection action plans are developed each year in consultation with ODFW. Oregon Division of State Lands regulates the removal and filling of materials in waterways. Permits are required for projects involving 50 cubic yards or more of material. Permit applications are reviewed by the ODFW and may be modified or denied based on project impacts on fish populations.

The Oregon Water Resources Department (OWRD) regulates water use in the subbasin. Guidelines for water appropriation (ORS 537) determine the maximum rate and volume of water that can legally be diverted as defined in the Hood Basin Program and its amendments. OWRD also acts as trustee for instream water rights issued to the state of Oregon and held in trust for the people of the state.

The Oregon Department of Forestry enforces the Oregon Forest Practices Act (OAR 629-Division 600 to 680 and ORS 527) regulating commercial timber production and harvest on state and private lands. The OFPA contains guidelines to protect fish bearing streams during logging and other forest management activities which address stream buffers and riparian management, road maintenance and construction standards and other topics.

The Oregon Department of Environmental Quality (DEQ) is responsible for implementing the 1972 federal Clean Water Act and enforcing state water quality standards for protection of aquatic life and other beneficial uses.

The Oregon Department of Transportation (ODOT) maintains highways that cross streams in the subbasin. A 1999 Hood River-Mt Hood (OR 35) Corridor Plan prioritized capital improvement and maintenance projects, some of which directly address impacts to fish habitat such as culvert passage. Under initiative through the Oregon Plan for Salmon and Watersheds, efforts to improve protection and remediation of fish habitat impacted by state highways are ongoing.

The Land Conservation and Development Commission regulates land use on a statewide level. County land use plans must comply with statewide land use goals, however enforcement against negligent counties appears to be minimal. Effective land use plans and policies are essential tools to protect against permanent fish and wildlife habitat losses and degradation, particularly excessive development along streams, wetlands and floodplains and in sensitive wildlife areas.

#### Local Government

Hood River County Soil and Water Conservation District (SWCD) works with local landowners, growers, and others to enact voluntary agricultural and other best management practices on private lands. The SWCD serves as fiscal agent and sponsor of the Hood

River Watershed Group and administer grants and projects to promote and implement conservation on private lands in the subbasin. With oversight and funding from Oregon Department of Agriculture, the SWCD is the local management agency for the *Hood River Agricultural Water Quality Management Area Plan* (in progress) to address agricultural water quality problems as required by State Senate Bill 1010.

The Hood River Watershed Group (watershed council) is working with landowners, agencies and the public to help resolve fish habitat and water quality problems in the subbasin. The *Hood River Watershed Action Plan* will be completed in late 2000 or early 2001 by the Hood River Watershed Group in close coordination with state, federal and tribal agency members. It will identify and prioritize specific watershed protection and restoration opportunities, strategies, and funding partnerships consistent with the 1999 Hood River Watershed assessment findings. The *Watershed Action Plan* is intended as a community-based plan that will incorporate, expand upon and compliment those projects identified in the *Hood River Habitat Protection, Restoration and Monitoring Plan* (CTWSRO 2000) as state and tribal anadromous fish priorities. *Watershed Action Plan* projects will be directed at the following work areas: (1) protecting stream reaches in relatively good condition; (2) restoring stream reaches currently in degraded condition but have the potential to develop high-quality habitat and fish usage - and where impacts and improvement opportunities are known; (3) investigating or collecting necessary data to monitor trends or fill information gaps and (4) educating landowners and the public about watershed stewardship and best management practices.

Hood River County Comprehensive Land Use Plan 1984 established land use policies, zoning ordinances, and maps defining urban growth boundaries, forest, agricultural and industrial lands according to statewide goals. The Oregon Land Conservation and Development Commission requires periodic reviews of maps and policies, however, Hood River County has failed to complete the required periodic reviews, including Goals 4 and 5 that address forest land and sensitive fish and wildlife habitat.

Farmers Irrigation District Water Conservation and Management Plan (1995) outlines objectives for the west side irrigation system including streamflow restoration.

### **Goals, Objectives, and Strategies**

The Hood River subbasin has diverse populations of fish and wildlife that are of economic and ecological significance to the people of the State of Oregon and the Northwest and of special cultural significance to the Confederated Tribes of the Warm Springs Reservation of Oregon and other treaty tribes. The general goal is to restore the health and function of the Hood River ecosystem to ensure continued viability of these important populations. Specific goals for fish and wildlife are outlined below.

#### **Fish Goals**

1. Protect, enhance and restore wild and natural populations of anadromous and resident fish within the Hood River Subbasin
2. Maintain the genetic integrity of indigenous and natural populations

### Fish Objectives

1. Reestablish and maintain an average run of 1,700 spring chinook to the Hood River mouth including a spawning escapement of 400 fish, broodstock needs of 200 220 fish and 1,100 1,080 fish available for harvest using a time target of the year 2016<sup>1</sup> or earlier.
2. Achieve and maintain an average run of 5,000 winter steelhead to the Hood River mouth including a spawning escapement of 2,400, broodstock needs of 200 90 fish and 2,400 2,510 fish available for harvest using a time target of the year 2016 or earlier.
3. Achieve and maintain an average run of 8,000 summer steelhead to the Hood River mouth including a spawning escapement of 2,400 and broodstock needs of 200 160 fish, and 5,400 5,440 fish available for harvest using a time target of the year 2016 or earlier.
4. Achieve and maintain self-sustaining populations of other indigenous anadromous and resident fish in the subbasin using a time target of the year 2016 or earlier.

It should be noted that spawning escapement goals are based on the estimated smolt production carrying capacity for the Hood River subbasin (ODFW and CTWSRO 1990) identified in the Columbia Basin System Planning process. Carrying capacity estimates were determined using a Tributary Parameters Model based on a subjective evaluation of habitat quality in selected watershed reaches, and on assumptions about spatial distribution for each population. The proportion of spawning escapement to returning run size goals differs among species because the natural production capacity, supplementation strategy, and harvest objectives are different for each species. For example, while the escapement goal is the same for both steelhead runs (2400), the run size goal is higher for summer steelhead (8000) than winter steelhead (5000) in recognition that summer steelhead are more vulnerable to harvest since they remain in the river for up to a year prior to spawning (J. Newton, ODFW, *personal comm.*) The Hood River Production Program, through the M&E projects, will continue to gather subbasin estimates on carrying capacity to determine if they are realistic or need to be readjusted. The HRPP Environmental Impact Statement is scheduled for review in the year 2002 and will revisit the issue of smolt carrying capacity and escapement goals.

### Fish Strategies

1. Supplement the naturally-spawning spring chinook population with a hatchery program consisting of Deschutes River stock returning to the Hood River. (Note: the indigenous population was extirpated in late 1960s).

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<sup>1</sup> Time target estimate is based on the following assumptions: (1) Subbasin fish passage improvements including screen upgrades expected to reduce in-river smolt mortality are completed by spring 2004; (2) after 2004, several 4-year return cycles are needed to confirm a solid trend in increased adult returns given climate variation and other survival factors; (3) habitat conditions and water quality improve as projects are completed and stream segments restored - habitat redevelopment succeeds within several years after most riparian and instream restoration projects are completed; (4) supplementation succeeds in boosting natural spawning of spring chinook and steelhead without altering genetic structure of target populations and (5) HRPP, law enforcement and other (non-BPA) funding continues and is expanded to complete priority projects identified in the Hood River Habitat Protection, Restoration and Monitoring Plan and the Hood River Watershed Action Plan.

- Action 1.1 Continue acclimating and volitionally releasing 125,000 spring chinook smolts into historic spring chinook habitat in the Hood River (potentially increasing up to 250,000 depending on program evaluation in 2002) and developing a locally-adapted Hood River broodstock.
  - Action 1.2. Phase out taking broodstock from the Deschutes River when natural returns are adequate for broodstock collection from the Hood River without posing a risk to the naturally spawning component of the reintroduced population.
  - Action 1.3. Identify and enforce laws and rules pertaining to fish passage, riparian habitat, and water quality protection. Provide information on enforcement actions to the system-wide conservation enforcement monitoring and evaluation project.
1. Minimize interaction of hatchery and exotic fish stocks with naturally reproducing indigenous fish populations.
    - Action 2.1. Prevent releases of hatchery-reared fish in watershed streams and rely on natural production to maintain fish populations.
  2. Action 2.2 Prevent expansion of brook trout stocking program to other high lakes in watershed and monitor to insure that brook trout are not distributing downstream into stream habitat below stocked lakes. Supplement the indigenous wild winter and summer steelhead populations with a hatchery program consisting of local broodstock to enhance natural production.
    - Action 2.1 Continue acclimating and volitionally releasing 60,000 winter and 30,000 summer steelhead smolts into historic winter and summer steelhead habitat areas in the Hood River (potentially increasing up to 85,000 winter and 150,000 summer steelhead smolts depending on program evaluation in 2002) using local broodstock.
    - Action 2.2 Evaluate advantages and disadvantages of eliminating the current Skamania stock summer steelhead releases on the Hood River wild summer steelhead supplementation effort and lower river sport fishery.
    - Action 2.3. Identify and enforce laws and rules pertaining to exotic fish transfers.
  3. Monitor the abundance, distribution and life history of anadromous and resident fish, and instream and riparian habitat conditions within the Hood River Subbasin to enable determination of trends.
  2. fish and the condition of instream and riparian habitat.
    - Action 3.1. Determine the baseline abundance, distribution and life history patterns of resident and anadromous salmonids using juvenile and spawner surveys to provide a means to monitor future trends.

- Action 3.1 Continue monitoring adult returns of all fish species at the Powerdale Fish Trap Facility.
  - Action 3.2 Continue operation of juvenile migrant (screw) traps
  - Action 3.3 Continue juvenile abundance, growth and distribution monitoring in index areas in Hood River streams.
  - Action 3.2. Conduct3.4 Expand comprehensive physical and biological surveys of streams and riparian corridors to better identify restoration needs.stream surveys in anadromous stream segments and re-survey selected anadromous streams altered by severe flooding in 1996.
  - Action 3.5 Continue and expand water quality monitoring in the Hood River watershed for pesticides, nutrients, bacteria, pH, and temperature
  - Action 3.6 Continue and expand spawning ground surveys and radiotracking studies of adult migrant anadromous fish and bull trout.
  - Action 3.3.3.7 Identify violations of laws and rules pertaining to habitat protection and provide information to appropriate state, federal or tribal law enforcement entity.
4. Protect, enhance and restore indigenous anadromous and resident fish habitat in the Hood River subbasin.
- Action 4.1 Maintain or improve passage for upstream and downstream migrant resident and anadromous salmonids and lamprey in the subbasin.
  - Action 4.2 Enforce those portions of the Oregon Forest Practices Act designed to protect water quality and the integrity of fish bearing streams.
  - Action 4.3 Continue instream and riparian habitat restoration efforts in the subbasin.
  - Action 4.4 Support timely updates and resource inventories related to local land use plans to prevent further development and degradation of floodplains, wetlands, riparian and other sensitive areas.
  - Action 4.5 Properly maintain, relocate or eliminate forest, public and private roads in riparian and other sensitive areas.
  - Action 4.6 Implement and enforce provisions of the Hood River Agricultural Water Quality Management Area Plan and support other efforts to prevent and/or remediate agricultural and non-agricultural pollution.
  - Action 4.7 Implement water conservation and stream flow restoration measures including increased orchard and residential water use efficiency and converting open distribution canals and ditches to pressurized pipe or lined canals.
  - Action 4.8 Implement recommendations for riparian, upland and water quality protection and restoration included in the U.S. Forest Service Watershed Analyses for the Hood River.
  - Action 4.9 Encourage compliance with the Aquatic Conservation Strategy portion of the US Forest Service Northwest Forest Plan.
  - Action 4.10 Develop and/or implement other land and resource management plans, including use of conservation easements or land acquisition,

- that will result in improved water quality and stream habitat in the subbasin.
- Action 4.11 Increase enforcement of laws and fishing regulations pertaining to illegal take of fish (all life stages).
- Action 4.12 Provide protection for federal and state threatened and sensitive fish species in all resource management plans.
- Action 4.13 Enforce state and local land use regulations designed to protect fish habitats.

5. Protect and/or maintain the genetic characteristics of the populations.

- Action 5.1 Continue implementing Oregon Wild Fish Policy and other approaches that seek to protect genetic characteristics of native populations.
- Action 5.2 Continue baseline genetic sampling in the subbasin.
- Action 5.3 Design and implement a comprehensive study to assess whether supplementation activities in the subbasin have been effective in rebuilding native and/or natural salmon and steelhead and maintaining the genetic structure of populations.
- Action 5.4 Continue using and/or improving hatchery broodstock collection practices that conserve genetic integrity and maintain natural genetic variability.

6. Protect federal and state threatened and sensitive fish species in the subbasin.

- Action 4.1.6.1. Increase enforcement of laws and fishing regulations and laws pertaining to illegal take of fish (all life stages).
- Action 4.2.6.2. Provide protection for federal and state threatened and sensitive fish species in all resource management plans.
- Action 4.3.6.3. Enforce state and local land use regulations designed to protect fish habitats.

**Wildlife Goal**

Protect and maintain populations of wildlife in the Hood River subbasin. Protect, enhance and restore wildlife populations in existing habitat in the Oregon Columbia Gorge Tributaries (Bonneville Dam to Hood River).

**Wildlife Objective**

Maintain wildlife species diversity in the Hood River subbasin.

**Wildlife Strategies**

1. Protect and enhance existing wildlife habitat.

- Action 1.1. Determine and monitor abundance and distribution of wildlife species to identify population status and habitat use trends in the subbasin.
- Action 1.2. Conduct periodic comprehensive habitat and biological surveys to identify and prioritize wildlife habitat protection and enhancement needs in the subbasin.
- Action 1.3. Implement wildlife enhancement projects in the subbasin as opportunities exist.
- Action 1.4. Decommission unnecessary roads to reduce harassment of wildlife and encourage more uniform use of available wildlife habitat.
- Action 1.5. Manage habitat to meet state management guidelines for upland birds and game mammals.
- Action 1.6. Improve local land use plans and development standards to prevent further loss and encroachment of winter habitat for deer and elk in the Hood River Valley.
- Action 1.7. Improve local land use plans and development standards to prevent further loss and encroachment of remaining east-west migration corridors for large mammals including deer and elk in the Hood River Valley.
- Action 1.8. Develop strategies to educate private landowners on how to coexist with wildlife and preserve or enhance habitat.

1. Protect, enhance and restore wildlife habitat altered by human activities

- Action 1.1. Support recommendations for wildlife habitat protection, enhancement and restoration specified in the U.S. Forest Service Watershed Analysis for this area.
- Action 1.2. Encourage compliance with provisions of the Columbia River Gorge National Scenic Area Management Plan which address wildlife habitat protection.
- Action 1.3. Work with ODOT to minimize road kill mortality of small and medium sized animals along Interstate Highway 84, such as re-design of solid concrete median barriers.

2. Protect federal and state threatened, endangered, and sensitive wildlife species in the Hood River subbasin.

- Action 2.1. Continue enforcement of wildlife laws and regulations affecting wildlife species and habitat.
- Action 2.2. Monitor the status of threatened, endangered and sensitive wildlife populations.
- Action 1.4.2.3 Provide protection for federal and state threatened, endangered, and sensitive wildlife species in all resource management plans.
- Action 1.5.2.4 Support the timely completion of local land use updates and inventories in fulfillment of statewide land use guidelines that protect wildlife habitat.

- Action 1.6. Enforce state and local land use regulations designed to protect wildlife habitat.
  - 2. species
    - Action 2.1. Continue Action 2.2. Monitor the status of threatened and endangered wildlife populations.
    - 2.5 Enforce state and local land use regulations designed to protect wildlife habitats.
    - Action 2.32.6 Encourage compliance with provisions of the Columbia River Gorge National Scenic Area Management Plan that address wildlife habitat protection.
- 3. Restore wildlife habitat where opportunities exist.
  - Action 3.1 Work with private, state and federal landowners to identify opportunities to restore wildlife habitat.
- 4. Protect, enhance and restore wildlife habitat altered by human activities
  - Action 4.1 Support recommendations for wildlife habitat protection, enhancement and restoration specified in the U.S. Forest Service Watershed Analysis for this area.
  - Action 4.2 Encourage compliance with provisions of the Columbia River Gorge National Scenic Area Management Plan which address wildlife habitat protection.
  - Action 4.3 Work with ODOT to minimize road kill mortality of small and medium sized animals along Interstate Highway 84, such as re-design of solid concrete median barriers.
  - Action 4.4 Provide protection for federal and state threatened, endangered, and sensitive wildlife species in all resource management plans.
  - Action 4.5 Support the timely completion of local land use updates and inventories in fulfillment of statewide land use guidelines that protect wildlife habitat.
  - Action 4.6 Enforce state and local land use regulations designed to protect wildlife habitat.

### **Research, Monitoring and Evaluation Activities**

This section describes ongoing research, monitoring and evaluation for the Hood River Oregon Columbia Gorge Tributaries Watershed (Bonneville Dam to Hood River) subbasin projects described in Section I-G, Existing and Past Efforts and outlines how progress is being measured in the subbasin.

The U.S. Forest Service monitors trail use rates and impacts of recreation use on shorelines within the Hatfield Wilderness and National Scenic Area, and has conducted amphibian surveys. The U.S. Forest Service Columbia River Gorge National Scenic Area is monitoring stream temperatures and has a physical stream inventory program that



collects limited data every five to ten years on selected streams in the subbasin. The U.S. Forest Service also monitors threatened and endangered species on federal lands.

Hood River County Weed and Pest Division surveys and maintains records of locations and extent of noxious weed infestations for control purposes.

The Columbia Basin Law Enforcement Council (CBLEC) coordinates state, federal and tribal conservation law enforcement efforts throughout the Columbia Basin. Currently, a consultant for Columbia River Inter-Tribal Fisheries Enforcement is conducting monitoring and evaluation of conservation enforcement in the mainstem Columbia River between Bonneville and McNary Dams, including cooperative enforcement actions in the tributaries.

#### BPA-funded Research, Monitoring and Evaluation Activities

Ongoing Monitoring and Evaluation activities (M&E) within the Hood River Production Program collect both comprehensive data about the status of Hood River fish populations and critical feedback for the effectiveness of supplementation and habitat restoration efforts, and needs identification.

Ongoing M&E under BPA Project No. 8805304 (Hood River Production Program M&E - ODFW) provides for the collection of critical baseline data about the abundance and life history patterns of juvenile and adult anadromous and resident fish. The number, age and stock origin (wild, natural, subbasin hatchery, and stray hatchery) of adult migrant anadromous fish and bull trout are counted at the Powerdale Fish Trap. Five juvenile migrant (screw) traps are used to (1) estimate numbers of downstream migrant wild and hatchery winter and summer steelhead smolts from different watersheds within the Hood River subbasin; (2) count numbers of spring chinook, resident trout and pacific lamprey collected; (3) estimate temporal distribution of downstream migrant wild and hatchery winter and summer steelhead smolts; (4) estimate age structure of downstream migrant steelhead smolts and (5) estimate selected biological and life history characteristics of downstream migrant steelhead smolts and resident trout, i.e., mean fork length, mean weight and condition factor. Electrofishing occurs biannually at 15 tributary index sites. Creel surveys are conducted in Hood River below Powerdale Dam (area open to angling) to estimate the number and stock origin of salmon and steelhead harvested to complete population estimates. M&E efforts under the BPA-funded projects described above are coordinated between ODFW and CTWSRO personnel and other project partners and are characterized by substantial inter-agency cooperation.

Ongoing M&E under BPA Project No. 8805303 (Hood River Production Program M&E - CTWSRO) consists of (1) collecting abundance, distribution and life history information on fishes in the Hood River subbasin; (2) evaluation of whether acclimated and volitionally released smolts results in increased smolt outmigration; increased smolt-to-adult survival; and minimal straying rates and effect on wild fish; (3) identify the population genetic structure, systematics, and distribution of steelhead, cutthroat, and resident trout and determine if historic hatchery releases have had a genetic impact on indigenous populations; (4) evaluate if the pesticide used and entering surface waters in the Hood River subbasin are adversely affecting steelhead; (5) continue to refine smolt

carrying capacity for summer and winter steelhead and spring chinook salmon and (6) steelhead and spring chinook hatchery evaluation.

BPA Project No. 9802100 (Hood River Production Program Habitat Improvements-CTWSRO) includes water quality monitoring and evaluations of the effectiveness of habitat projects, e.g., riparian fencing and revegetation, fish passage improvements and instream habitat structures. Fish passage monitoring includes biological testing of facilities, pre- and post- project electrofishing in irrigation canals and other methods as appropriate. In general, habitat protection and remediation progress is being measured in the subbasin using the following types of metrics:

- Number of stream miles where livestock or other impacts are eliminated or prevented and the riparian zone is allowed to recover.
- Number of stream miles to which access was improved or from which juvenile mortality/canal entrainment was eliminated or dramatically cut.
- Improvements in habitat quality in stream reaches using ODFW Aquatic Inventories Project benchmarks, e.g., amount of pools, instream wood, riparian cover and spawning gravels and similar values used by the US Forest Service.
- Changes in redd counts in spawning habitats restored.
- Improvements in water quality e.g., pesticides, temperature, turbidity, pH, nutrients and bacteria indicated by water sampling studies.
- Number of road miles treated, constructed, closed and obliterated within each subwatershed and overall road density.

The cumulative progress of the HRPP program including its habitat and supplementation components will ultimately be measured by achievement of wild and hatchery spawning escapement and run size goals -- but also by evidence of expanding distribution and habitat utilization in historic anadromous habitat, increased species diversity, increased juvenile abundance at index areas and success in maintaining the genetic characteristics of populations. Examination of potential relationships among adult returns, juvenile abundance and other variables such as streamflow are part of these M&E efforts.

#### Non BPA-funded Research, Monitoring and Evaluation Activities

Ongoing and periodic physical and biological stream surveys and wildlife inventories are conducted by the U.S. Forest Service on federal lands in the subbasin. These include macroinvertebrate sampling, bull trout juvenile and adult surveys, stream temperature and project monitoring for instream habitat restoration. An adult fish trap is operated by ODFW and the U.S. Forest Service below Laurance Lake and at the base of Clear Branch Dam in the primary habitat area for bull trout. Since the majority of the bull trout population is located on National Forest, these activities assist state and federal fishery managers in helping to protect this sensitive population. U.S. Forest Service monitoring and evaluation of instream habitat structures is especially important to watershed restoration subbasin wide as it provides adaptive lessons about how and where to place future structures. Northern spotted owl nesting sites on National Forest are also routinely monitored, along with other sensitive species. Water quality monitoring is ongoing by a number of agencies (Refer to Section I-G). Deer and elk populations in the subbasin are

monitored annually through aerial and foot surveys and inventories. Upland game bird and raptor surveys are conducted annually.

### **Statement of Fish and Wildlife Needs**

The following near-term priority fish and wildlife needs for the Oregon Columbia Gorge Tributaries (Bonneville Dam to Hood River) subbasin are based on the findings and recommendations in the Columbia Tributaries East Watershed Analysis (USFS 1998) and information collected by CTWSRO, ODFW, and U.S. Forest Service (HRWG 1999); the East, Middle and West Forks Hood River Watershed Analyses (USFS 1996a; 1996b) and the Hood River Habitat Protection, Restoration and Monitoring Plan (CTWSRO 2000). Projects that address the following needs are directed at satisfying fish and wildlife management goals, objectives and strategies for the subbasin:

- **Protection and restoration of native fish populations**

Continuation of the Hood River Production Program supplementation, monitoring and evaluation is needed to reintroduce and build a locally-adapted Hood River spring chinook run<sup>2</sup> and rebuild the wild summer and winter steelhead run. The project is continuing monitoring of life history and genetic structure to prevent population change and to protect native populations. Numbers of returning spring chinook and summer and winter steelhead remain depressed in comparison with historic conditions and to escapement and harvest goals. Hood River steelhead and bull trout are listed as threatened species under the Endangered Species Act. The Hood River bull trout are genetically unique and number fewer than 300 juveniles and adults. Hood River sea run cutthroat appear to be severely depressed, with a maximum annual return within the last five years of just five fish. Pacific lamprey have declined in recent years and none are observed except in the lower Hood River below Powerdale Dam.

Investigation is needed in the Hood River to identify what factors may be responsible for lamprey decline, so that corrective actions can be taken. From 1992 to 1998, between 33 and 98 naturally produced spring chinook were counted at Powerdale Dam Fish Trap. Counts during this period for wild summer steelhead were between 65 to 477 and between 194 to 678 for wild winter steelhead. Due to low abundance, the supply of anadromous carcasses to the aquatic food chain is lacking and likely limits stream productivity. M&E activities associated with the Hood River Production Program are essential to continue to monitor the population status of salmonids as habitat improvements, increased fisheries enforcement and other actions are taken. Comprehensive evaluations are needed to determine whether and to what degree smolt supplementation is working in the Hood River to strengthen the wild or naturally spawning component of target populations. The Hood River and the West Bonneville Pool are popular fishing areas. State and tribal fisheries enforcement must continue to deter illegal fishing as a means of protecting threatened and weak fish runs.

- **Improvement in fish passage where affected by artificial barriers**

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<sup>2</sup> Hood River spring chinook indigenous stock were extirpated from the Hood River in the 1960s. A reintroduction effort was begun in 1992 using Deschutes River stock.

The upstream migration of salmon, steelhead and resident trout is blocked or impeded at numerous locations by diversion dams, culverts and other structures, resulting in the failure to seed historically utilized spawning and rearing habitat. Direct mortality of downstream migrant salmonids occurs in canals and ditches associated with unscreened or inadequately screened water diversions. Opportunities exist to improve fish passage at approximately 12 sites supporting anadromous fish and bull trout. A limited survey of culvert passage remediation needs on state and county public roads has identified 46 culvert barriers that were ranked medium or low priority by ODFW. Culvert surveys are ongoing and/or planned to identify passage remediation needs on National Forest, County forest and other road ownerships. Monitoring and evaluation needs associated with fish passage improvements include (1) continued baseline fish salvage data collection in irrigation or power canals with unscreened/inadequately screened diversions; (2) post-project hydraulic and biological testing of compliance with state and federal fish screen criteria, screen efficiency and injury rates; (3) post-project fish salvage data collection in canals to evaluate facility performance; compare to baseline fish salvage data; (4) periodic physical and/or hydraulic inspection of passage structure, e.g., culvert, ladder, screen or other improvement to insure proper operation; (5) spawning ground surveys to assess habitat utilization above passage improvement and (6) other methods as appropriate, e.g., radiotracking, to determine fish migration success or evaluate reduction in delay or amelioration of poor passage conditions.

- **Water quality improvement**

Summer and early fall water temperatures exceed preferred ranges for salmonid life stages in a number of stream reaches. Laurance Lake collects heat and exports warm water into Clear Branch during fall as cool water is depleted throughout spring and summer by discharge via a single deep outlet. Pesticide contamination, elevated nutrients, sediment, turbidity, bacteria level and high pH episodes in lower stream reaches are measured. Vegetation removal along streams has decreased shade, bank stability and water retention capabilities. Seasonal turbidity is a natural aspect of subbasin habitat given its geology, steep terrain and glacial characteristics, but human activities that add sediment and cause chronic or prolonged turbidity need to be controlled. Surface erosion and mass wasting associated with forest and public roads, undersized culverts, bank erosion, irrigation ditches, livestock access to streams and other activities are raising the natural sediment load and increasing turbidity in the subbasin. Glacial silt is imported into several non-glacial tributaries used to convey irrigation water from glacial East and Middle Fork Hood river sources. A broad range of projects and practices must be implemented on private and other lands to monitor, prevent and reduce agricultural and other water quality contamination in the subbasin. Enforcement of the Hood River Agricultural Water Quality Management Area Plan, the Forest Practices Act, state water quality standards and the U.S. Forest Service Aquatic Conservation Strategy will help protect and improve water quality. There is an urgent need to expand work with landowners, the agricultural industry, irrigation districts and local government to install additional livestock fencing and off-channel watering devices, promote pesticide best management practices and alternatives to pesticides, irrigation efficiency, improve roadside management, and expand use of

stream buffers. Associated monitoring needs include (1) water quality sampling, e.g., pesticides, temperature DO, pH, nutrients, turbidity; (2) invertebrate and amphibian surveys; (3) pre-and post-project surveys including shade, substrate composition, channel morphology; (4) use of photo points to document changes over time and (5) periodic inspection of livestock fence installations to insure maintenance.

- **Restoration of streamflows**

During low summer and fall flow conditions, water diversions diminish or dewater aquatic habitat, impede fish migration and contribute to warm water temperatures and water quality impairment. Land use activities affecting natural infiltration, subsurface storage and recharge also contribute to reduced summer flows. The most severe streamflow problem in the subbasin is found below the East Fork Irrigation District diversion, which legally dewateres anadromous habitat in the East Fork Hood River during extreme summer low flows. Important opportunities exist to work cooperatively with irrigation districts, growers and others to restore streamflows to a more natural condition in the subbasin and other areas using water efficiency savings. A substantial need for cost-share funds to convert open irrigation ditches and canals to pressurized pipe, improve streamflow and water use monitoring, expand use of orchard soil moisture sensors and micro-sprinkler technology and continue water conservation education. These approaches have significant secondary benefits, including reduced sediment delivery to streams, reduced landslide risks, reduced runoff containing contaminants and lower electricity demands for pumping.

- **Restoration of habitat structure, function and diversity**

The historic structural habitat capable of supporting former population levels of anadromous fish is lacking in much of the Hood River Subbasin. Given high peak flows, steep and confined channels - the present lack of instream structure is believed to be an especially significant limitation to salmonid productivity. Historic timber harvest, extensive splash dams, stream clean-out and other land use practices have resulted in simplified channels and riparian zones with little instream or potential recruitment of large woody debris - reducing pool area and frequency. Availability of flood refuge, hiding cover, over-wintering and productive early rearing lateral habitats and side channels is minimal compared to historical conditions. Sediment deposition, transport and meander processes have been altered. Many channels have downcut and become disconnected from their floodplains, while others have widened and aggraded. Most channels lack the wood structure to trap and retain gravel for spawning and invertebrate production and instead are dominated by coarse boulder and rubble substrates. Gravel tends to wash up on the stream banks out of the low-water channel where it is unavailable for use, particularly by fall spawners. Opportunities exist to place additional large woody debris in depositional, forested stream segments to encourage the development of complex pool and lateral habitats, promote stream/floodplain interactions and trap gravels within the low flow channel. Associated monitoring and evaluation needs include (1) documenting the influence of LWD on pool development and habitat complexity at various flows; (2) establish permanent survey response reaches to monitor changes in channel geometry, slope, gravel deposition; (3) track downstream and lateral movement of wood placements after flood

events; (4) monitor substrate composition using Wolman 1954 or similar methods; (5) monitor treated reaches and compare habitat characteristics relative to ODFW Aquatic Inventories Project 1995 or similar benchmark values or standards and (6) monitor fish usage associated with stream and riparian improvement projects.

- **Restoration and increased protection of floodplain areas**

Channelization, road fill, bank armoring and other encroachments along stream segments have narrowed channels and limited meander inside floodplains. This has created shorter channels, steeper gradients, higher velocities, loss of storage and recharge capacity, bed armoring and entrenchment. Construction and maintenance of State Highway 35 has realigned and confined about seven miles of the East Fork into a narrow channel bordering the Highway, causing the river to steepen and preventing it from stabilizing within the valley floor. Channel modifications in Neal Creek interact with each flood event to further incise the streambed. An urgent need exists to update the existing Hood River County floodplain ordinance, improve and update Federal Emergency Management Act (FEMA) floodplain mapping to prevent further development in floodplains. Opportunities exist to setback levees and revetments, move or remove road and bridge fills and prevent new development along streams and within floodplains.

- **Preservation of viable wildlife populations through improved habitat protection, habitat enhancement, and law enforcement**

Wildlife habitats in the Hood River Valley area have been substantially altered by human development over the last 150 years. Conifer forest has been replaced by apple and pear orchards, roads, pasture and homes. These environments do not provide the year-round hiding, thermal and snow accumulation cover for birds and mammals that conifer forests provide. As a result, a net loss of shelter for wildlife exists, especially in winter, at elevations under 2,500 feet. Structural attributes missing in orchards and most rural residential properties are damaged live and standing dead trees, and large-diameter downed trees that provide nesting cavities, scanning perches and insect-feeding substrate for birds and other wildlife. ODFW management seeks to maximize deer and elk populations on public lands and find a balance between landowner and wildlife needs on private lands, as opposed to managing big game out of existence in the Hood River subbasin. While remnant forest patches are present among subbasin cultivated and developed lands, these are often fragmented. East-west migration routes across the lower valley have been lost, while an important east-west mid-valley migration corridor in Middle Mountain is being compromised by new subdivisions. The winter range of large migratory animals in the Hood River Valley floor has been usurped by human habitation. Half the remaining winter range of deer and elk is on private land. Damage to fruit trees by deer, elk, and bear, and other wildlife complaints, are common in the subbasin. There is a need to limit encroachment into forest habitat by new development to avoid further losses and intensified human-wildlife conflicts. Effective educational strategies must be developed to educate homeowners about how to coexist with wildlife. There is a need to improve winter and year-round habitat on county, private and federal forest lands by planting or allowing grasses and forbes to grow - promoting a "no spray" policy on private and county land. This would encourage big game to

remain on forest lands instead of foraging in residential areas or orchards. Basic inventories of sensitive, threatened and endangered wildlife species are urgently needed, along with management plans for these species written in cooperation with Hood River County. The need for continued law enforcement is integral to wildlife and habitat protection in the subbasin, along with forest road closures, obliteration and other road treatments that would minimize poaching and harassment and reclaim habitat for wildlife. Local governments are required to prepare inventories of wildlife habitat, riparian corridors, wetlands and other significant habitats under Goal 5 of the Oregon Department of Land Conservation and Development Statewide Planning Program. These habitat inventories are intended to determine which resources are most significant and to take steps to protect them (DLCD 1997). Hood River County has not completed its periodic reviews or required inventories, potentially leaving wildlife at risk of incompatible development or inducing greater conflict between wildlife and people given continued growth pressures.

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## **AREA 2: THE LOWER OREGON COLUMBIA RIVER TRIBUTARIES SUBBASIN SUMMARY**

### **Fish and Wildlife Assessment**

#### **Subbasin Description**

##### **Drainage Area**

The Lower Bonneville Columbia River Tributaries Subbasin covers 66,920-acre area consisting of numerous small tributaries that enter the Columbia River on the Oregon side of the Columbia River between Bonneville Dam and the Hood River. Eagle Creek is the longest tributary at 11.5 miles. Other major tributaries include Herman, Viento, Lindsey and Phelps creeks. The subbasin is in Hood River County and includes the city of Cascade Locks.

##### **Climate**

The Columbia Tributaries subbasin lies in the transition zone between the wet marine climate to the west and the dry continental climate to the east. Precipitation amounts vary dramatically from east to west and with elevation, ranging from 125 to 40 inches annually. Abrupt topographic and climate changes along this stretch of the Gorge has created a patchwork of diverse habitats in closer proximity than found elsewhere in the Cascades.

##### **Topography/geomorphology (geology/soil types)**

Stream hydrology is characterized by a transient snowpack between 1,000 and 4,000 feet elevation, mostly perennial streamflow and relatively high base flows. During low flows, several creeks have subsurface flow near their confluence with the Columbia River. Extensive seeps and springs feed the creeks along with high elevation lakes and wetlands. The northerly aspect of stream channels and deep shaded canyons contribute to wet, cool conditions.

Land elevations range from 72 feet to 5,000 feet above sea level, with Mt. Defiance as the major peak. Volcanic lava flows, glaciation and flooding were key forces forming the Columbia Gorge landscape of steep basalt cliffs, waterfalls, talus slopes and sharply defined ridges. Landslides are the dominant erosional processes in recent history. Alluvial fan deposits at the mouths of the steeper, more constricted creeks where they join the Columbia River suggest the frequent routing of debris torrents down these channels. The lower mile or so of major creeks have gradients of about five percent with lower gradient areas in the broad, glaciated headwater valleys. Around 100 small lakes and ponds totaling 110 surface acres are concentrated in glaciated areas above 3,800 feet elevation. The largest is the 60-acre Wahtum Lake at the headwaters of Eagle Creek. Bedrock and boulder substrate dominates the streambeds.

##### **Vegetation**

Vegetation communities include riparian hardwoods like red alder, big leaf maple, black cottonwood and Oregon ash, and varied wetlands along the Columbia River which rapidly

change to upland western hemlock forest on the west end to Douglas fir, grand fir and Oregon oak/ponderosa pine forests on the east.

#### Major Land Uses

Except around the Columbia River corridor and in the Phelps Creek drainage near the city of Hood River, the watershed is largely undeveloped. Lowland areas have been flooded by Bonneville Pool while the other lowlands are impacted by railroads, I-84, urban development, farms, parks, fish hatcheries, and industrial sites. Over 90 percent of the watershed is publicly-owned, with 25,185 acres in the Columbia River Gorge National Scenic Area (CRGNSA) and 39,891 acres in the Mark O. Hatfield Wilderness Area managed by the U.S. Forest Service. The State of Oregon owns 2,093 acres of parkland, while Hood River County owns 1,039 acres of managed timberland. A population of approximately 2,000 lives in Cascade Locks and the rest of the watershed is largely uninhabited. Outdoor recreation is the major activity in the watershed (Figure 13).

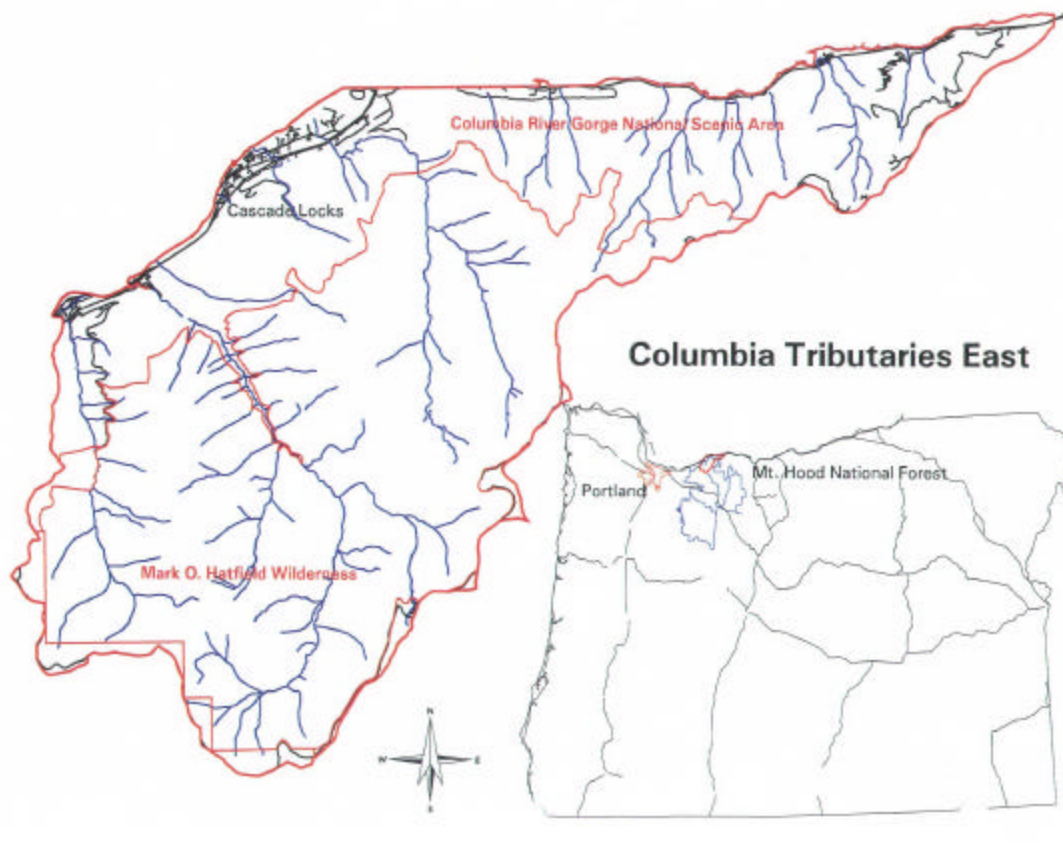


Figure 13. Location of the Oregon Columbia Gorge Tributaries subbasin referred to by the U.S. Forest Service as the “Columbia Tributaries East” (1998)

## Fish and Wildlife Status

### Fish

Three anadromous species are present in the Oregon Columbia Gorge Tributaries subbasin (Figure 14). Anadromous fish passage and habitat capacity is limited by natural waterfall barriers within the lower mile or two in these creeks with the exception of Herman Creek, where 5.6 stream miles are accessible to anadromous fish. Steelhead trout (*Oncorhynchus mykiss*) and chinook salmon (*O. tshawytscha*) are observed in Eagle, Herman, Lindsey and Viento creeks. Coho salmon (*O. kisutch*) are observed in the lower reaches of Herman, Lindsey and Viento creeks. Spawner surveys, redd counts, smolt or juvenile population data are not available for this subbasin. Steelhead are listed as a federally threatened species since March 1998 as part of the Lower Columbia Ecologically Significant Unit. Very little information exists about fish or other aquatic species prior to 1900. Some anadromous stocks are believed to be native while others may be derived from hatchery stocks, but little or no genetic analyses are currently available to determine which stocks are of natural or hatchery origin.

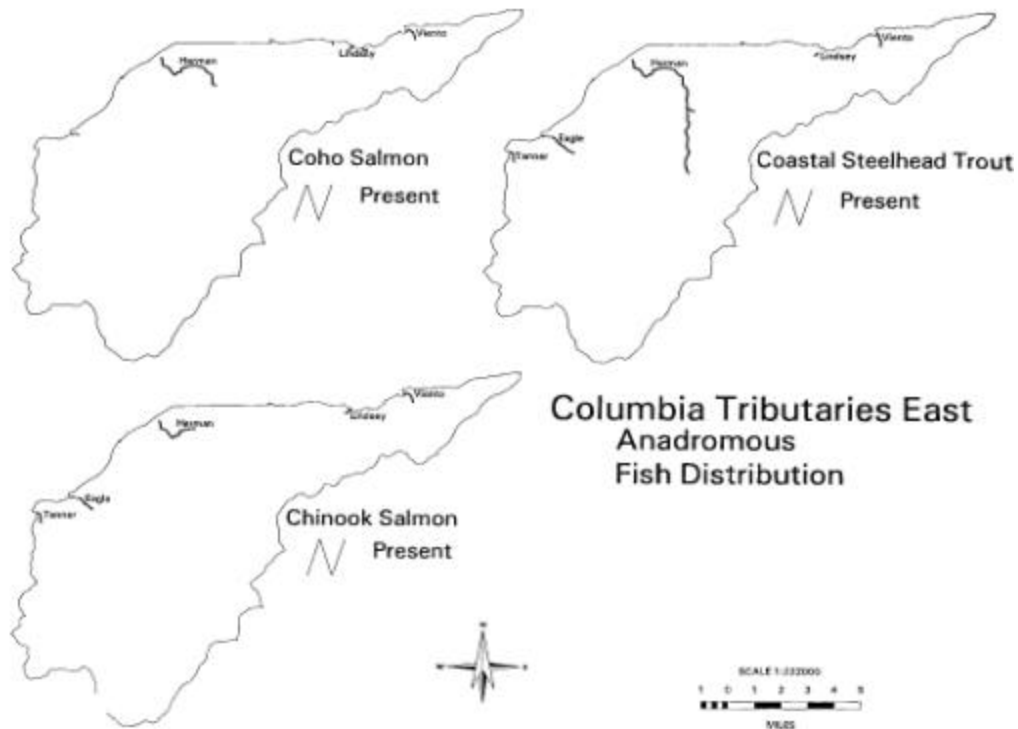


Figure 14. Distribution of anadromous fish in the Oregon Columbia Gorge Tributaries subbasin including Tanner Creek. This area is named "Columbia Tributaries East" by the U.S. Forest Service - Columbia Gorge National Scenic Area (USFS 1998)

Rainbow trout (*O. mykiss gairdneri*) are the predominant resident salmonid present in the watershed. Cutthroat trout have been observed in Lindsey and Viento creeks. Bull trout are potentially able to enter and use tributary mouths. Torrent sculpin (*Cottus rhotheus*) are present. The possible presence of an inland subspecies of rainbow trout (*O. mykiss irideus*) is noted above barrier falls in Lindsey Creek but genetic confirmation is not yet completed.

Brook trout (*Salvelinus fontinalis*) are present in several high lakes as result of a hatchery stocking program. Most lakes and ponds were probably fishless prior to stocking, with the possible exception of Wahtum Lake, since no other lake now has fish species other than the introduced brook trout. No information is available on other species present.

#### Wildlife

Animals present in the watershed include black tail deer, mule deer, elk, black bear, beaver and other fur bearers, waterfowl, bats, pika, yellow-bellied marmot, grouse, great blue heron and various reptiles, amphibians, birds, insects, and other game and non game species. Include scientific names to be consistent. Endangered, rare or uncommon animals are listed in Table 6. Grizzly bear, gray wolf, mountain goat and California condor were noted as present in the Gorge by Lewis and Clark but are now extirpated from the area. A number of introduced non-native animals such as bullfrog, Norway rat and house mice now inhabit the watershed.

The watershed is within the Oregon Department of Fish and Wildlife (ODFW) Hood River Management Unit 42 which extends from the Pacific Crest trail to Highway 35. This unit is managed for a winter population of 400 deer and 130 elk. ODFW radio-tracking studies indicate that deer from the northern Hood River valley migrate into the Columbia Tributaries area during winter.

Table 6. Endangered, rare or uncommon animals in the Oregon Columbia Tributaries (Bonneville Dam to Hood River) watershed analysis area and their population status (USFS 1999; Jim Torland, ODFW pers. comm.; and Richard Larsen, USFS-CRGN SA pers. comm.)

Year Round Resident	Status	Notes
bald eagle	Threatened	1 known nest site
peregrine falcon	Endangered	2 known nest sites
pileated woodpecker		Occasionally seen or known as present in 1980*
purple martin		2 known nesting colonies
northern spotted owl	Threatened	USFS 1992- 94 survey: approximately 20 owls resided in Hatfield Wilderness
Larch Mountain salamander	Region 6 sensitive species	
Cope's giant salamander	Region 6 sensitive species	
red legged frog	State sensitive species USFS Region 6 sensitive species	
Cascade frog		Occasionally seen or known as present in 1980*
Western pond turtle	USFS Region 6 sensitive species	
painted turtle	USFS Region 6 sensitive species	
rubber boa		Commonly seen in 1980*
wolverine		Population estimated at 4 animals in 1980*. One killed on Interstate 84 at Starvation Creek in 1990

<b>Possible Year Round or Seasonal Resident</b>		
harlequin duck		1980 nesting pop. estimated at 20*
goshawk		Occasionally seen or known as present in 1980*
Vaux's swift		Occasionally seen or known as present in 1980*
red fox		25 estimated population in 1980*
marten		50 estimated population in 1980*

\*1980 ODFW wildlife survey of Hood River County

### **Habitat Areas and Quality**

The upper stream elevations within the Wilderness and Scenic Area are in a near natural condition, with most of the watershed in late seral forest reserves having numerous hiking trails but few or no roads. On the other hand, the lower stream elevations within two to three miles from the Columbia River have been altered by the Bonneville Dam and reservoir, highway, railroad and other developments as well as historic logging and stream clean-out activities. Road culverts and man-made diversions have modified stream channels and prevent floodplain and meander development.

### **Fish**

Two artificial migration barriers are associated with fish hatchery operation in the watershed. The Cascade Hatchery diversion dam on Eagle Creek at River Mile 1.0 has no fish ladder. The Oxbow Hatchery diversion dam on Herman Creek at River Mile 1.1 is outfitted with a fish ladder.

Selected U.S. Forest Service stream survey data is shown in Table 7. Herman Creek has the most anadromous habitat (5.6 miles) and is considered to have the potential to become a superior anadromous fish rearing habitat (USFS 1998). Herman Creek has been affected by past logging, stream clean-out activities and floods such as the February 1996 event which flushed out the large wood debris and habitat structure needed by anadromous salmonids. Existing pool habitat and in-channel large wood in Herman Creek do not meet the aquatic habitat standards and guidelines in the Mt. Hood National Forest Land and Resource Management Plan. Zero to 22 pieces of large woody debris (LWD) per mile were found in reaches surveyed in 1998, while the desired future condition is 80 or more pieces per mile (USFS 1998).

Table 7. Selected stream habitat survey information for major anadromous streams in the Oregon Columbia Tributaries watershed between Bonneville Dam and Hood River (USFS 1998).

Stream Name & Survey Reach	Survey Date	Stream Habitat Condition			Anadromous Migration Barrier Location natural (artificial)
		No. Pools /mile	Pieces LWD /mile	Gradient	
Eagle Creek (1) RM 0.5 - 5.5	1990	10.2	1	5%	River mile 2.0 (diversion dam near river mile 1.0)
Herman Creek (1) RM 0.0- 0.8 (2) RM 0.8-2.8 (3) RM 2.8-4.3 (4) RM 4.3-4.8	1994	2.4 9.5 8.1 14.6	0 26.9 29.8 12.5	3% 5% 7% 8%	River mile 5.6 (fish ladder at diversion dam at river mile 1.1)
East Fk Herman Creek (1) RM 0.0- 0.1	1995	39	29	12%	River mile 0.1
Lindsey Creek	1996	summary data unavailable but # of pools low			River mile 0.23

The U.S. Forest Service estimated the historical condition of anadromous fish habitat by comparing the relatively natural, unmanaged upper reaches of each stream with the lower reaches where railroads, highways, logging and other developments have occurred. The number of large wood pieces and pools per mile in the upper reaches are considered close to presumed natural conditions.

Water quality in this watershed is currently among the best in Oregon. Summer stream temperatures are typically between 55° and 60° F and are ideal for salmonid production. Water clarity in high lakes and tributaries is excellent, with the exception of Phelps Creek where road-related sediment input occurs periodically. Soils in areas around upland lakes are exposed due to recreational overuse. These lakes are high in phosphorous due to natural geologic conditions and are sensitive to nitrogen inputs. Bacterial contamination and increasing nitrogen levels are noted as a concern. Moving recreation activities back from lake and stream shorelines could further improve conditions (USFS 1998).

Viento Creek is diverted for irrigation water, while Eagle and Herman creeks are diverted for water supply at ODFW Cascade and Oxbow salmon hatchery facilities. The hatchery diversions are screened. Dry Creek is used by the City of Cascade Locks as a supplemental and emergency source of municipal water.

#### Wildlife

Special wildlife habitats in this watershed include high basalt cliffs, high and low elevation talus and scree slopes, wet meadows, dryland balds, riparian woodlands and subalpine parkland. The most substantial alteration of wildlife habitat since European settlement has been the flooding and loss of lowland riparian hardwood communities along the Columbia River (USFS 1998). The existence of the Bonneville Pool prevents mammals from crossing the Columbia River. North-south migration of medium to large mammals had



been possible prior to Bonneville Dam construction during low flows and when the river froze over (formerly about every five years). The Oregon Department of Fish and Wildlife considers road kill along Interstate 84 to be a significant source of mortality for small to medium-sized wildlife. Road kill of small and medium sized mammals is aggravated by the design and use of solid concrete median barriers (Jim Torland, ODFW *pers. comm.*).

Wells Island, purchased by the Scenic Area for its wildlife habitat values, is home to the only blue heron rookery in the Bonneville Pool and the largest nesting population of Canada geese. ODFW habitat surveys suggest that 10 to 20 percent of the island has disappeared as a result of erosion since 1984. Over the last 5 years, the average number of great blue heron nests on Wells Island has dwindled from 29 to nine.

The U.S. Forest Service watershed analysis team evaluated existing and potential future conditions relative to the Northwest Forest Plan Aquatic Conservation Strategy (ACS) Objectives<sup>3</sup>. ACS objectives were generally met in the Hatfield Wilderness and upper Scenic Area; were not met in lower stream reaches except for water quality and sediment regime; and were not met in the Columbia River. The potential to meet ACS objectives was considered high on federal lands excluding the lower reaches in the I-84 transportation corridor, although some improvement was possible towards all objectives except landscape. Opportunities to meet ACS objectives in the Columbia River are restricted by existing hydropower facilities although a potential for some improvement in water quality, riparian plants and species habitat was noted. Desired future conditions were identified as maintaining lakes and stream conditions in the upper portion and improved fish passage, streamflow, riparian habitat, instream diversity and floodplain function in the lower or anadromous portion of streams. Given the existence of the Bonneville Dam and pool, the desired future condition in the Columbia River and associated lowlands is a healthy riparian hardwood community for riparian-dependent species.

### **Watershed Assessment**

The Forest Service conducted fish habitat surveys in Eagle, Herman, East Fork Herman, and Lindsey creeks between 1991 and 1998. A Watershed Analysis for the Columbia Tributaries East was prepared in 1998 (USFS 1998). This analysis excluded Phelps Creek where land use was considered more similar to the mainstem Hood River.

Wildlife populations and habitat were estimated in 1980 for Hood River County by the Mid-Columbia District of ODFW (Torland 1986, unpub.data). A waterfowl, physical habitat and plant species inventory of Wells Island in the Columbia River has been conducted from 1984 to the present by the District.

The U.S. Forest Service-Columbia River Gorge National Scenic Area conducted a detailed field survey of Herman Creek between July and September 1999 for habitat restoration planning purposes (USFS-CRGNSA 1999). This survey will be completed by Fall 2000.

The Natural Heritage Program maintains a database on habitats and species occurrences throughout the state of Oregon. The Oregon Trust Agreement Planning Project (BPA 1993) and the Oregon Gap Analysis Project (ODFW 1997) identified gaps in bio-

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<sup>3</sup> The objectives concern landscape, connectivity, physical integrity, water quality, sediment regime, instream flows, floodplain, riparian plants and species habitat.

diversity and needs for terrestrial habitat restoration. These two planning efforts resulted in a prioritized list of potential habitat restoration opportunities in Oregon.

An assessment to quantify impacts on wildlife and wildlife habitat as a result of the construction of Bonneville Dam was completed in 1990 (Rasmussen and Wright 1990). Impacts were measured from Bonneville Dam upriver to The Dalles Dam. Wildlife mitigation goals and objectives for the Hood River subbasin are based on this loss assessment. Wildlife losses caused by the construction of Bonneville Dam were amended into the Northwest Power Planning Council's Fish and Wildlife Program. Losses were measured in Habitat Units (HUs) for selected target/indicator species and are associated to priority habitats.

### **Major Limiting Factors**

#### **Fish**

Anadromous fish passage and habitat productivity is limited these tributaries by natural waterfalls and further limited by artificial migration barriers. Habitat productivity for anadromous and resident salmonids is also limited by a lack of pools and woody debris cover in the lower stream reaches up to two or three miles from the Columbia River as a result of past logging, stream clearing or other human activities. The potential may exist to restore access to one mile of anadromous habitat by providing passage around a man-made barrier below the waterfall in Eagle Creek.

#### **Wildlife**

Extensive loss of former lowland hardwood riparian vegetation along the Columbia River shoreline and road kill mortality along Interstate 84 (I-84) are believed to be the major limiting factors for small and medium sized wildlife.

Wildlife abundance is also limited by the on-going effects of past hydropower development, continued hydropower operation, past and current land management practices and the spread of non-native plant and wildlife species. The decline of salmonids and other fish species results in a loss of overall biomass being contributed to the subbasin. This reduction has negative effects on wildlife abundance. Opportunities to restore wildlife populations and improve habitat conditions diminish over time as genetic diversity is lost and as habitat is lost or severely degraded.

#### **Artificial Production**

Although no direct anadromous fish releases are made in the watershed, some natural spawners in these creeks may be of hatchery origin given existing hatchery operations on Eagle and Herman creeks at the ODFW Oxbow and Cascade hatcheries. These salmon hatcheries support a variety of programs. Records indicate Eagle and Herman creeks were stocked with fingerling coastal rainbow trout annually in the 1940s. It is unknown if the present trout distribution is from hatchery stock or wild origins. Several of the high lakes have been stocked with brook trout since the early 1900s. U.S. Forest Service surveys to date suggest that brook trout have not distributed into tributaries downstream of stocked lakes. Concern for high lake stocking by the U.S. Forest Service centers around (1) alteration of the food chain in historically fishless lakes affecting native amphibian and other species and (2) potential escape of stocked fish into downstream tributaries affecting

native stocks. No HGMP information was prepared for the Oregon Columbia Gorge Tributaries as no supplementation or hatchery program occurs or is planned for this subbasin.

### **Existing and Past Efforts**

The Columbia Tributaries East Watershed Analysis prioritized recommended projects for fish and wildlife (USFS 1998). Priorities included adding large wood and increasing pool habitat in anadromous segments of streams where currently below Mt. Hood National Forest standards. The Forest Service/Columbia River Gorge National Scenic Area (CRGNSA) plans to place log structures in Eagle Creeks in summer 2000, and proposes placing logs and rock structures at 28 or more potential sites in the lower three miles of Herman Creek up to the Scenic Area Boundary between 2001 and 2006.

A priority identified in the Watershed Analysis is working with ODFW to provide fish passage at man-made barriers below waterfalls on Herman and Eagle creeks. The ODFW and CRGNSA plan to correct a fish passage problem in Herman Creek at the Oxbow Fish Hatchery diversion fish ladder (river mile 1.0) in spring or summer 2000 or 2001.

Wildlife surveys and inventories are periodically conducted by USFS, CTWSRO, and ODFW. Deer and elk radio collar studies are ongoing to confirm winter and summer ranges. Research regarding whether lynx are present in the Cascades and the status of wolverines is being conducted by the USFS. From 1969 to the mid-1970s, ODFW reintroduced a total of 17 mountain goats to the area but none have been seen since 1990.

As yet, no site-specific wildlife mitigation projects have been funded by BPA in this watershed. Only about 10 percent of Habitat Unit losses as a result of Bonneville Dam construction have been mitigated. The Oregon Wildlife Coalition is implementing a programmatic mitigation project *Securing Wildlife Mitigation Sites: Oregon (Project No. 9705900)*, that could implement wildlife mitigation projects within the Lower Mid-Columbia including the Hood River Subbasin. The goals of this project are to (1) fund coordination activities to identify, plan, propose, and implement wildlife mitigation projects; (2) prioritize potential mitigation projects; (3) acquire or ease lands with priority habitats; (4) enhance acquired or eased lands through alteration of land management practices, active restoration; control of noxious weeds, control of public access, etc. to benefit target/indicator species and priority habitats and (5) develop and implement a monitoring and evaluation plan. One project in the Oregon Columbia Gorge Tributaries Watershed, *Securing Wildlife Mitigation Site: Oregon - Mitchell Point (Project No. 9705909)*, was recommended by the Northwest Power Planning Council for funding in FY 1999 but has not yet been implemented.

Currently, 23 invasive plant species are targeted for control or eradication by the Hood River County Weed and Pest Division, which uses Integrated Pest Management techniques to control noxious weeds, combining biological controls, herbicide use and mechanical mowing or removal. Hood River County serves as the coordinating agency and contracts with BPA, Oregon State Parks, Oregon Department of Transportation, the U.S. Forest Service and others to control noxious weeds in the watershed.

## Subbasin Management

### Existing Plans, Policies, and Guidelines

Major plans, policies, regulations and guidelines that focus on protection of streams, wildlife habitat, fish and other aquatic life in the Hood River subbasin are described briefly below. While effectiveness in implementing these plans, policies and regulations varies, efforts to increase inter-agency coordination and cooperation are being made in the subbasin. Improved implementation of all of these plans, policies, regulations and guidelines are essential to the success of all fish and wildlife efforts, including BPA-funded fish and wildlife projects.

### Federal

The U.S. Forest Service (USFS) manages federal lands in the subbasin. Land allocations, management standards and guidelines for the subbasin are specified in (1) Mt. Hood National Forest Land and Resource Management Plan (USFS 1990); (2) the Northwest Forest Management Plan Standards and Guidelines for Management of Habitat for Late Successional and Old-Growth Forest Related Species Within the Range of the Northern Spotted Owl (1994 Northwest Forest Plan) and (3) Final Management Plan for the Columbia River Gorge National Scenic Area (1992). The 1994 Northwest Forest Plan includes an *Aquatic Conservation Strategy* (ACS) to maintain and restore the health of watersheds and aquatic ecosystems on public lands. Its four components (riparian reserves, key watersheds, watershed analysis and watershed restoration) are designed to operate together to maintain and restore the productivity and resiliency of riparian and aquatic ecosystems on federal lands. All proposed and existing USFS activities in the subbasin are designed to meet the intent of the ACS objectives. Private, state and other land development activities within the Scenic Area boundary outside of urban areas are reviewed by the U.S. Forest Service for consistency with the Columbia River Gorge National Scenic Area Management Plan.

The U.S. Fish and Wildlife Service administers the Endangered Species Act (ESA) for resident fish. The National Marine Fisheries Service administers the ESA as it pertains to anadromous fish. These agencies review and comment on activities that affect fishery resources and develop recovery plans for listed species in the subbasin.

### Tribal Government

The Confederated Tribes of the Warm Springs Reservation of Oregon is responsible for protecting and enhancing treaty fish and wildlife resources and habitats for present and future generations. Members of the CTWSRO have federally reserved treating fishing and hunting rights within the subbasin pursuant to the 1855 Treaty with the Tribes of Middle Oregon and affirmed in *United States v. Oregon*, 1974. CTWSRO co-manages fish and wildlife with ODFW. In addition, CTWSRO reviews and comments on development proposals relative to the protection of treaty fish and wildlife resources within the subbasin.

### State Government

Oregon Department of Fish and Wildlife (ODFW) is responsible for protecting and enhancing Oregon fish and wildlife and their habitats for present and future generations. ODFW co-manages fishery and wildlife resources together with the CTWSRO, and jointly implements the BPA-funded Hood River Protection Program. Management of fish and wildlife and their habitat in the Hood River subbasin is guided by ODFW policies and federal and state legislation. ODFW policies and plans applicable to the subbasin include the *Natural Production Policy* (OAR 635-07-521 to 524), *Wild Fish Management Policy* (OAR 635-07-525 to 538 ), and *Oregon Guidelines for Timing In-Water Work to Protect Fish and Wildlife Resources* (ODFW 1986).

Passed into law in 1997, *Oregon Plan for Salmon and Watersheds* and the Steelhead Supplement to the Oregon Plan (1998) outlines a statewide approach to ESA concerns based on watershed restoration and ecosystem management to protect and improve salmon and steelhead habitat in Oregon. The Oregon Watershed Enhancement Board facilitates coordination among state agencies, administers a grant program and provides technical assistance to local Watershed Councils and others to implement the Oregon Plan.

The Oregon State Police patrols the subbasin to enforce laws and regulations designed to protect fish and wildlife. Specific area and resource protection action plans are developed annually in consultation with ODFW. Oregon Division of State Lands regulates the removal and filling of materials in waterways. Permits are required for projects involving 50 cubic yards or more of material. Permit applications are reviewed by the ODFW and may be modified or denied based on project impacts on fish populations. The Oregon Water Resources Department (OWRD) regulates water use in the subbasin. Guidelines for water appropriation (ORS 537) determine the maximum rate and volume of water that can legally be diverted as defined in the Hood Basin Program and its amendments. OWRD also acts as trustee for instream water rights issued to the state of Oregon and held in trust for the people of the state.

The Oregon Department of Forestry enforces the Oregon Forest Practices Act (OAR 629-Division 600 to 680 and ORS 527) regulating commercial timber production and harvest on state and private lands. The OFPA contains guidelines to protect fish bearing streams during logging and other forest management activities which address stream buffers and riparian management, road maintenance and construction standards and other topics.

The Oregon Department of Environmental Quality (DEQ) is responsible for implementing the 1972 federal Clean Water Act and enforcing state water quality standards for protection of aquatic life and other beneficial uses. The Oregon Department of Transportation maintains highways that cross streams in the subbasin. Under initiative through the Oregon Plan for Salmon and Watersheds, efforts to improve protection and remediation of fish habitat impacted by state highways are ongoing.

The Land Conservation and Development Commission regulates land use on a statewide level. County land use plans must comply with statewide land use goals. Effective land use plans and policies are essential tools to protect against permanent fish and wildlife habitat losses and degradation, particularly excessive development along streams, wetlands and floodplains and in sensitive wildlife areas.

#### Local Government

Hood River County Soil and Water Conservation District (SWCD) works with local landowners, growers and others to enact voluntary agricultural and other best management practices on private lands. The SWCD serves as fiscal agent and sponsor of the Hood River Watershed Group, and administer grants and projects to promote and implement conservation on private lands in the subbasin. With oversight and funding from Oregon Department of Agriculture, the SWCD is the local management agency for the *Hood River Agricultural Water Quality Management Area Plan* (in progress) to address agricultural water quality problems as required by State Senate Bill 1010. This plan applies to agricultural activities within the subbasin.

Hood River County Comprehensive Land Use Plan 1984 established land use policies, zoning ordinances and maps defining urban growth boundaries, forest, agricultural and industrial lands according to statewide goals. The Oregon Department of Land Conservation and Development requires periodic reviews of maps and policies, however, Hood River County has failed to complete the required periodic reviews in a timely manner, including Goals 4 and 5 that address forest land and sensitive fish and wildlife habitat.

Farmers Irrigation District Water Conservation and Management Plan (1995) outlines objectives for the west side irrigation system including streamflow restoration.

#### Goals, Objectives and Strategies

The Oregon Columbia Gorge Tributaries (Bonneville Dam to Hood River) form a unique and diverse habitat area of largely undeveloped lands within the Hatfield Wilderness and the Columbia River Gorge National Scenic Area. These lands will remain protected into the foreseeable future. Utilization of available habitat by wildlife and indigenous fish species will maintain the highly significant natural heritage value of this area. The overall goal is to continue to protect and restore the health and function of the watershed. Available anadromous habitat is restricted by natural waterfalls and the lower stream reaches have been altered by human activity including the Bonneville Pool and Interstate 84 rail transportation corridor. However, the mid-to-upper elevation terrestrial and aquatic habitats are in natural or near-natural conditions. Specific goals, objectives, and strategies are listed below.

#### Fish Goal

Protect, enhance and restore wild and natural anadromous and resident fish populations within the Oregon Columbia Gorge Tributaries watershed.

#### Fish Objective

Maintain natural populations of anadromous and resident salmonids at levels that promote increased utilization of available habitat and that contribute to tribal and non-tribal fisheries as measured by an increasing trend in population abundance and distribution by the year 2012.

### Fish Strategies

3. Protect, enhance and, where feasible, restore instream and riparian habitat lost or degraded as a result of human activities in the lower to middle stream elevations of the watershed.
  - Action 1.1. Improve adult fish passage up to the natural barrier (RM 5.6) in Herman Creek by modifying fish ladder at the Oxbow Hatchery diversion dam (RM 1.1).
  - Action 1.2. Implement the Herman Creek Fish Habitat/Enhancement Restoration Project (log and boulder placement) between RM 1.1 and 3.0.
  - Action 1.3. Implement other recommendations for riparian and water quality protection, enhancement and restoration included in the U.S. Forest Service Watershed Analysis for this area.
4. Minimize interaction of hatchery and exotic fish stocks with naturally reproducing indigenous fish populations.
  - Action 2.1. Prevent releases of hatchery-reared fish in watershed streams and rely on natural production to maintain fish populations.
  - Action 2.2. Prevent expansion of brook trout stocking program to other high lakes in watershed and monitor to insure that brook trout are not distributing downstream into stream habitat below stocked lakes.
5. Monitor the abundance, distribution and life history of anadromous and resident fish and the condition of instream and riparian habitat.
  - Action 3.1. Determine the baseline abundance, distribution and life history patterns of resident and anadromous salmonids using juvenile and spawner surveys to provide a means to monitor future trends.
  - Action 3.2. Conduct comprehensive physical and biological surveys of streams and riparian corridors to better identify restoration needs.
6. Protect federal and state threatened and sensitive fish species in the subbasin.
  - Action 4.1. Increase enforcement of laws and fishing regulations pertaining to fish.
  - Action 4.2. Provide protection for federal and state threatened and sensitive fish species in all resource management plans.
  - Action 4.3. Enforce state and local land use regulations designed to protect fish habitats.

### Wildlife Goal

Protect, enhance and restore wildlife populations in existing habitat in the Oregon Columbia Gorge Tributaries (Bonneville Dam to Hood River).

Wildlife Objective  
Maintain wildlife species diversity.

Wildlife Strategies

3. Protect, enhance and restore wildlife habitat altered by human activities

- Action 1.1. Support recommendations for wildlife habitat protection, enhancement and restoration specified in the U.S. Forest Service Watershed Analysis for this area.
- Action 1.2. Encourage compliance with provisions of the Columbia River Gorge National Scenic Area Management Plan which address wildlife habitat protection.
- Action 1.3. Work with ODOT to minimize road kill mortality of small and medium sized animals along Interstate Highway 84, such as re-design of solid concrete median barriers.
- Action 1.4. Provide protection for federal and state threatened, endangered, and sensitive wildlife species in all resource management plans.
- Action 1.5. Support the timely completion of local land use updates and inventories in fulfillment of statewide land use guidelines that protect wildlife habitat.
- Action 1.6. Enforce state and local land use regulations designed to protect wildlife habitat.

4. Protect federal and state threatened, endangered, and sensitive wildlife species

- Action 2.1. Continue enforcement of wildlife laws and regulations affecting wildlife habitat.
- Action 2.2. Monitor the status of threatened and endangered wildlife populations.
- Action 2.3. Encourage compliance with provisions of the Columbia River Gorge National Scenic Area Management Plan that address wildlife habitat protection.

**Research, Monitoring and Evaluation Activities**

This section describes ongoing research, monitoring and evaluation for the Oregon Columbia Gorge Tributaries Watershed (Bonneville Dam to Hood River) described in Section I-G, Existing and Past Efforts and outlines how progress is being measured in the subbasin.

The U.S. Forest Service monitors trail use rates and impacts of recreation use on shorelines within the Hatfield Wilderness and National Scenic Area, and has conducted amphibian surveys. The U.S. Forest Service Columbia River Gorge National Scenic Area is monitoring stream temperatures and has a physical stream inventory program that collects limited data every five to ten years on selected streams in the subbasin. The U.S. Forest Service also monitors threatened and endangered species on federal lands.



Hood River County Weed and Pest Division surveys and maintains records of locations and extent of noxious weed infestations for control purposes.

### **Statement of Fish and Wildlife Needs**

The following near-term priority fish and wildlife needs for the Oregon Columbia Gorge Tributaries (Bonneville Dam to Hood River) subbasin are based on the findings and recommendations in the Columbia Tributaries East Watershed Analysis (USFS 1998) and information collected by ODFW and U.S. Forest Service. Projects that address the following needs are directed at satisfying fish and wildlife management goals, objectives and strategies for the subbasin:

- **Improvement in fish passage where affected by artificial barriers**  
Anadromous fish habitat in subbasin streams is limited by natural waterfalls within one to several miles from the Columbia River. Improving adult fish passage up to these natural waterfalls past diversion structures is needed in order to help maximize use of available habitat by anadromous and resident fish.
- **Restoration of habitat structure, function and diversity**  
Habitat complexity within streams and riparian areas has been reduced by human activities in the middle to lower portions of subbasin streams. There is a need to restore stream and riparian habitat including large woody debris and boulder placement where opportunities exist in order to improve the availability of rearing and spawning habitat.
- **Monitoring of juvenile and adult fish species, population abundance, distribution and habitat quality**  
The availability of fish population and distribution data is very limited in the subbasin. Little comprehensive monitoring has occurred to establish a baseline for population status and distribution of anadromous and resident fish species in subbasin streams. Little habitat information has been collected in many subbasin streams. Comprehensive physical and biological surveys are needed to assess existing habitat conditions and changes over time as a result of stream improvements and land management.
- **Completion of Updated Wildlife Population and Habitat Inventories**  
Basic inventories of sensitive, threatened and endangered wildlife species are urgently needed, along with management plans for these species written in cooperation with Hood River County and the U.S. Forest Service. The need for continued law enforcement is integral to wildlife and habitat protection in the subbasin, along with forest road closures, obliteration and other road treatments that would minimize poaching and harassment and reclaim habitat. Local governments are required to prepare inventories of wildlife habitat, riparian corridors, wetlands and other significant habitats under Goal 5 of the Oregon Department of Land Conservation and Development Statewide Planning Program. These habitat inventories are intended to determine which resources are most significant and to take steps to protect them. Hood River County has not completed its periodic reviews or required inventories, potentially leaving wildlife and native plant communities at risk of incompatible

development or inducing greater conflict between wildlife and people given continued growth and recreational use pressures.

- **Evaluation of the need for a shoreline stabilization plan for Wells Island**

Wells Island in the Columbia River just west of the Hood River port area contains the only great blue heron rookery in the Bonneville Pool and is an important habitat for a variety of other nongame wildlife species. The island was purchased by the federal government as part of the Columbia River Gorge National Scenic Area. Wells Island has experienced severe shoreline erosion and a loss in acreage of up to 20 percent as a result of fluctuating water levels in the Bonneville Pool. Surveys indicate that the number of nesting sites for herons and other birds have declined in recent years. There is a need for ODFW and the Columbia River Gorge National Scenic Area to assess whether a shoreline stabilization plan is required.

- **Preservation of viable wildlife populations through improved habitat protection, habitat enhancement and law enforcement**

Radio-collar studies of deer and elk show significant movement from the Hood River watershed into the Oregon Columbia Gorge Tributaries watershed during winter, presumably because winter habitat is very limited in the Hood River Valley as a result of development. There is a need to improve winter and year round habitat on county, private, and federal forest lands by planting or allowing grasses and forbes to grow by encouraging a "no spray policy" on private and county forest land. This would help encourage big game to remain on forest lands instead of needing to forage in residential areas or orchards. Educational strategies must also be developed to educate homeowners on private land in the Phelps Creek area and lower parts of the Oregon Columbia Gorge Tributaries watershed about how to coexist with wildlife. There is a need to work with Oregon Department of Transportation to develop alternative highway median barrier designs to replace the existing solid concrete highway median barriers that increase mortality of small and medium sized mammals crossing Interstate Highway 84.

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